Service Manual

HI-MATIC F (168)

Minolta

FOREWORD

We have issued this service manual to assist you in carrying out complete repair service. It gives your thorough description of the services which are essential to this Minolta product, and thus enables you to be your own consultant in maintaining quality and precision. This HI-MATIC F service manual consists or eight parts, viz., specifications, explanation of mechanism, parts list, disassembly instructions, reassembly instructions, check list, adjustment instructions, and special tools list. For easy reference, each subject has an index sheet.

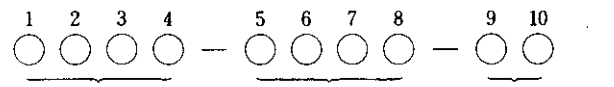
How to use the Service Manual

Specifications: This gives various product particulars item by item. It serves as technical reference material when inquiries are received from domestic and overseas customers.

Explanation of mechanism: Products which have new mecnanism are explained in detail.

Parts list:

1) This is composed of a table of contents, disassembled diagrams, parts numbers, parts names, and quantity of parts.
2) It is arranged with disassembled or exploded drawings on the left page and the parts numbers, parts names and quantity of parts on the right page.
3) On each page, the disassembled parts bear their respactive parts numbers.
4) Parts which are not supplied are indicated by "NO SUPPLY" in place of parts numbers in the disassembled diagrams.
5) "See Page·····" appearing in the disassembled diagrams incicates that the blocks concerned are shown disassembled on cited page(s).
6) Make-up of the Parts Code: The parts code is indicated by ten number speces as illustrated below:



7) Indication of Parts nbers:
   A. Coupled Parts Numbers: A main part code with 0 in the fifth space indicates coupled parts.
      Example: 5 6 7 8 — 9 10
      ⓪ ① ⓪ ⑦ — ○ ○
   B. Simple Parts Numbers: A main part code with 1 to 9 in the indicates simple parts.
      Example: 5 6 7 8 — 9 10
      ② ⑤ ④ ③ — ○ ○
   C. Auxiliary Part Code Numbers: The 9 th and 10 th spases are for auxiliary code numbers indicating how often the parts have been altered.
      Example: 5 6 7 8 — 9 10
      ○ ○ ○ ○ — ⓪ ②

D. Coupled parts which can also be supplied as simple parts are indicated with light-face-type figures as shown below:
Example: **0175-01** (Coupled parts)
1742-01

E. Speciel care in observing the related footnote is necessary with reference to parts having a ★ Symbol in front of their numbers.

8) Revised pages will be issued indicating the number of times it has been revised by using the numbers 1, 2, 3 and so on following a hyphen after the page number, as shown in the following example. When revision are made on page 1, the first revision will be indicated by 1-1 the second by 1-2, the by 1-3 and so on.

Disassembly instructions: This is an easy-to-understand guide that gives clear, step-by-step instructions so that even beginners can disassemble the HI-MATIC F.

Reassembly instructions: This further an easy-to-understand guide gives similar clear, step-by-step instructions for reassembling this product.

Check List: After repairing the HI-MATIC F be sure to check that it conforms to all the contents of the check list.

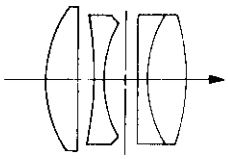
How to adjust: This is a guide to the main points of adjustments to be accompllshed after repair of this camera.

Special Tools List: **(Measuring Instruments)** This is a list of the special tools and instruments required for repairing or adjusting the HI-MATIC F.

HI-MATIC F (168)

(168-100 with self gear)
(168-200 with out self)
(168-500 Black body with out self gear)
(168-600 Black body with self gear)

LENS ROKKOR 38mm F2.7



Lens element:	4 elements in 3 groups
Lens type:	Tessar type
Coating:	Magenta, Amber
Angle of view:	61°
Aperture:	EE, FM (No available manual operation)
Aperture blade:	2 blades

SHUTTER SEIKO-ESL (705 type)

Speed:	Auto from 4 sec. to 1/724 sec. FM at only 1/20 sec.
Blade:	2 blades
Synchronization contact:	"X" contact
Guide number scale:	7, 10, 14, 20, 28, 40, 56
Self timer:	About 10 sec.

FILM ADVANCE

Winding:	Lever type, quick advance winding automatically cocks
Winding angle:	170°
Film counter:	Automatic resetting counter show the number of exposed frame
Film rewinding:	Rapid crank film rewinding for (R) button
Film size:	24 × 36mm Standard 35mm film J 135.

VIEW FINDER

Finder type:	Reversible-Galileo type
Finder effiency:	0.5 times
Length of range finder base:	12.5mm
Bright frame:	Tinted bright frame viewfinder
Finder parallax:	Automatic (Holizontal) parallax correction device. EE indicator lamp and flashmatic signal visible while viewing.

FOCUSING:

Focusing:	Front-element helicoid type coupled to super imposed range finder
Minimum focusing distance:	2.6 ft (0.8 m)

Distance scale:

0.8	1	1.2	1.5	2	3	5	∞	m
2.6	3	4	5	7	10	20		ft

EXPOSURE CONTROL

	CdS cell in the lens barrel
Measurement method:	Measurement of reflected light
Light receiving angle:	Vertical angle 16° Holizontal angle 26°(ASA 100)
Coupling method:	Lens opening is automatically set with program EE
Working range:	Program EE EV 0.9(F 2.7/4 sec.) to EV 17(F 13/1/724 sec.)
ASA range:	ASA 25 to 500(DIN 15 to 28)
ASA scale:	ASA 25 · · 50 · · 100 · · 200 · · · 500 (32)(40) (64)(80) (125)(160) (250)(320)(400)
BATTERY:	Mallory RM-640 (1.4V) × 2 Everedy E-640 (1.4V) × 2 or equivalent
SIZE:	4 7/16″ × 2 7/8″ × 2 1/8″ 113 × 73 × 54mm
WEIGHT:	12.8oz (350g)
Filter mount:	46φ mm screw in
Lens shade:	46φ mm screw in
Lens cap size:	48φ mm slip on
ACCESSORIES	Electro-Flash 2 Filter (1A, Y-48, UV, ND, 054, R59, 80B) Lens shade (with case)

FEAUTURES

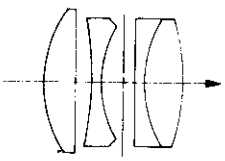
- Electronic type programmed shutter.
- Sensitive on the lens CdS cell.
- Cordless flash system.
- Flashmatic-mode signal all visible while viewing.
- Battery check lamp located on top cover.

SALES DATE Mar. 1972

ハイマチック F (168)

(168-100 自セルフナシ) (168-500 ブラックセルフナシ)
(168-200 自セルフ付) (168-600 ブラックセルフ付)

レンズ　ロッコール 38ミリ F2.7



構　　成：3群4枚
タ　イ　プ：テッサータイプ
コーティング：マゼンタ，アンバー
写　　角：61°
絞り形式：EE絞り，FM絞り
絞り羽根：シャッター羽根兼用（2枚）
絞り目盛：マニュアル絞りナシ
　　絞り値について表示ナシ

シャッター

SEIKO-ESL（705型）
露出時間：AUTOの時4sec～1/724sec
　　（プログラムEE EV 0.9～EV 17）
　　FMの時 1/20sec
羽　　根：2枚
シンクロ接点：X接点(M球バルブ使用可)
GN目盛：7，10，14，20，28，40，56
セルフタイマー：EEセルフ 約10秒

フィルム送り

巻上形式：一操作レバー式（分割巻上不可）
巻上角度：170°(引き外し角30° 前余裕角20°)
カウンター形式：自動復元順算式
使用フィルム：J135，24×36ミリフィルム
フィルム装填：裏蓋蝶番開閉式，オートロック，六ツ溝スプール，フィルムシグナル式
巻戻し形式：R釦セットによる折りたたみクランク戻し

ファインダー

形　　式：逆ガリレオ式，透視型ブライトフレーム付レンジファインダー
倍　　率：0.5X
有効基線長：12.5ミリ
基　線　長：25ミリ
ブライトフレーム：採光式
パララックス匡正：上左マーク式
距　離　計：一眼二重像合致式，三層干渉膜，ハーフミラー使用，ミラー回転式

焦点調節

形　　式：一眼二重像合致式
繰出形式：シングル回転ヘリコイド，前玉繰出し
最短撮影距離：0.8m (2.6ft)
距離目盛：

	0.8	1	1.2	1.5	2	3	5		
m								∞	
ft	2.6	3	4	5	7	10	20		

露出制御

受光方式：CdS測光による電気制御プログラムEE
受光角度：上下16°，左右26°(ASA方式ASA100にて測定)
連動方式：プログラムEE
連動範囲：EV 0.9(F2.7，4sec)～
　　EV 17(F13，1/724)
　　使用フィルム(ASA 25～500)に対して
使用フィルム感度域：ASA 25～ASA 500(DIN 15～28)
フィルム感度合せ：ASA 切換リングを廻して合わす
ASA目盛：ASA 25・・50・・100・・200・・・500
　　(32)(40)　(64)(80)　(125)(160)　(250)(320)(400)
使用水銀電池：JIS記号 HM-N型(1.4V) 2個
　　マロリー記号 RM-640 2個

寸法・重量

大　　き　さ：横巾 113×高さ 73×奥行 54ミリ
重　　量：350グラム
フィルター寸法：46φ（ネジ込み式）
レンズフード寸法：46φ（ネジ込み式）
レンズキャップ寸法：48φ（カブセ式）

附属品

皮ケース，ハンドストラップ

特　徴

- EEプログラム式電子シャッター付カメラ
- 専用ストロボ使用によりオートフラッシュ撮影が可能
- 露光の状態をランプシグナルで，ファインダー内に表示するカメラ
- "Apodize"シャッターによる描写の美しさを与える

発売日　昭和47年6月

Explanation of Mechanism

1. The Triangular Wave-Form Shutter of the 168

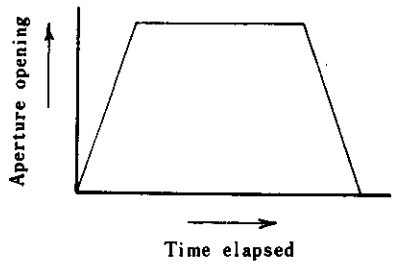


Fig. 1 Conventional shutter

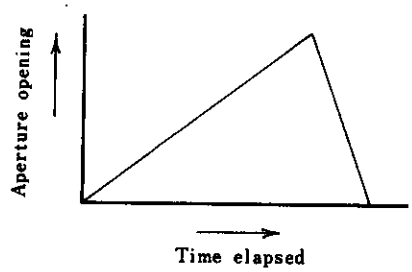


Fig. 2 Triangular wave-form shutter

The opening and closing motions of a lens shutter's blades are illustrated by representing the time elapsed horizontally and the aperture opening vertically. The typical conventional shutter has a characteristic curve as show in Fig. 1, while the 195's shutter is characterized by the curve shown in Fig. 2.

This shutter, when used as a between-the-lens shutter, surpasses the conventional lens shutters in "motion-stopping" ability and has the following major advantages:

1. It provides excellent rendition of movement and direction.
2. It limits photographic distortion.
3. Like a lens that transmits less light at its edges than in the center, it provides a clearer out-of-focus image.
4. It provides greater depth of field (as by closing down the aperture).
5. It is advantageous in reducing aberrations.

For reference:

Previously motion-stopping performance was judged only by blurry images; however, it must now be judged in terms of blurry images, resolution, contrast, fuzziness, human psychology (for example, feeling of movement and direction), grain of film, and so forth.

Taking all these factors into consideration, we have done reseach on the relative advantages of the triangular wave-from shutter and the conventional between-the-lens shutter.

In September, 1970, we presented the results of our research to the Academy of Applied Physics, where they were confirmed theoretically.

Because the triangular wave-form shutter has the above-mentioned advantages, it is adopted as the between-the lens shutter for the Hi-Matic F (168). It has a curve as shown in Fig. 3.

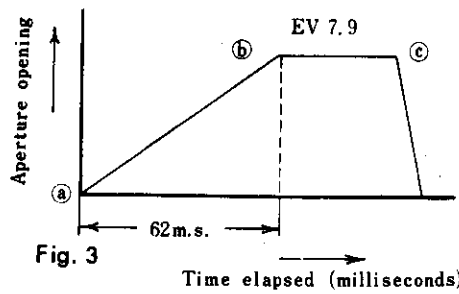


Fig. 3

A bright subject (EV 7.9 to EV 17) is programmed within the area from ⓐ to ⓑ shown in Fig. 3, while a dark subject (EV 7.9 or less) is programmed within the area from ⓑ to ⓒ shown in Fig. 3.

2. Function of 3-Terminal CdS and Rs

ⓐ : Ideal curve of light-receiving element
ⓑ : Characteristic curve of CdS+R4
ⓒ : Characteristic curve of CdS+R4+VR

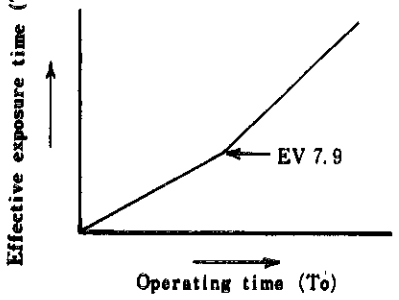


Fig. 4

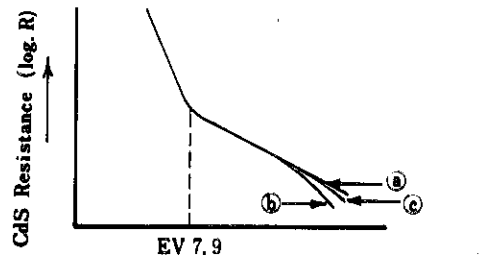


Fig. 5

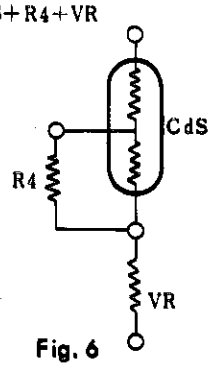


Fig. 6

The shutter curve is shown in Fig. 3, and programming is different according to the brightness of the subject, i. e., that of more than EV 7.9 and that of less than EV 7.9.

Therefore, the relation between the operating time of the shutter (To) and the effective exposure time (Te) should be as indicated in Fig. 4. To make this Te-To curve, the characteristic curve of the light-receiving element should be as shown in Fig. 5 ⓐ.

However, it is very difficult to obtain the required curve by using only CdS. So the curve shown in Fig. 5 ⓑ is obtained by combining two CdS elements with 3 terminals as shown in Fig. 6 and resistance (R4).

As can be seen in Fig. 5, there is a small discrepancy in luminosity between the characteristic curve thus obtained and the ideal curve. This discrepancy can be corrected mechanically to make the characteristic curve nearer to the ideal curve. Since such correction is easier the smaller it is, however, fixed variable resistance VR is further connected in series with the CdS.

The characteristic curve shown in Fig. 5 ⓒ is thus obtained.

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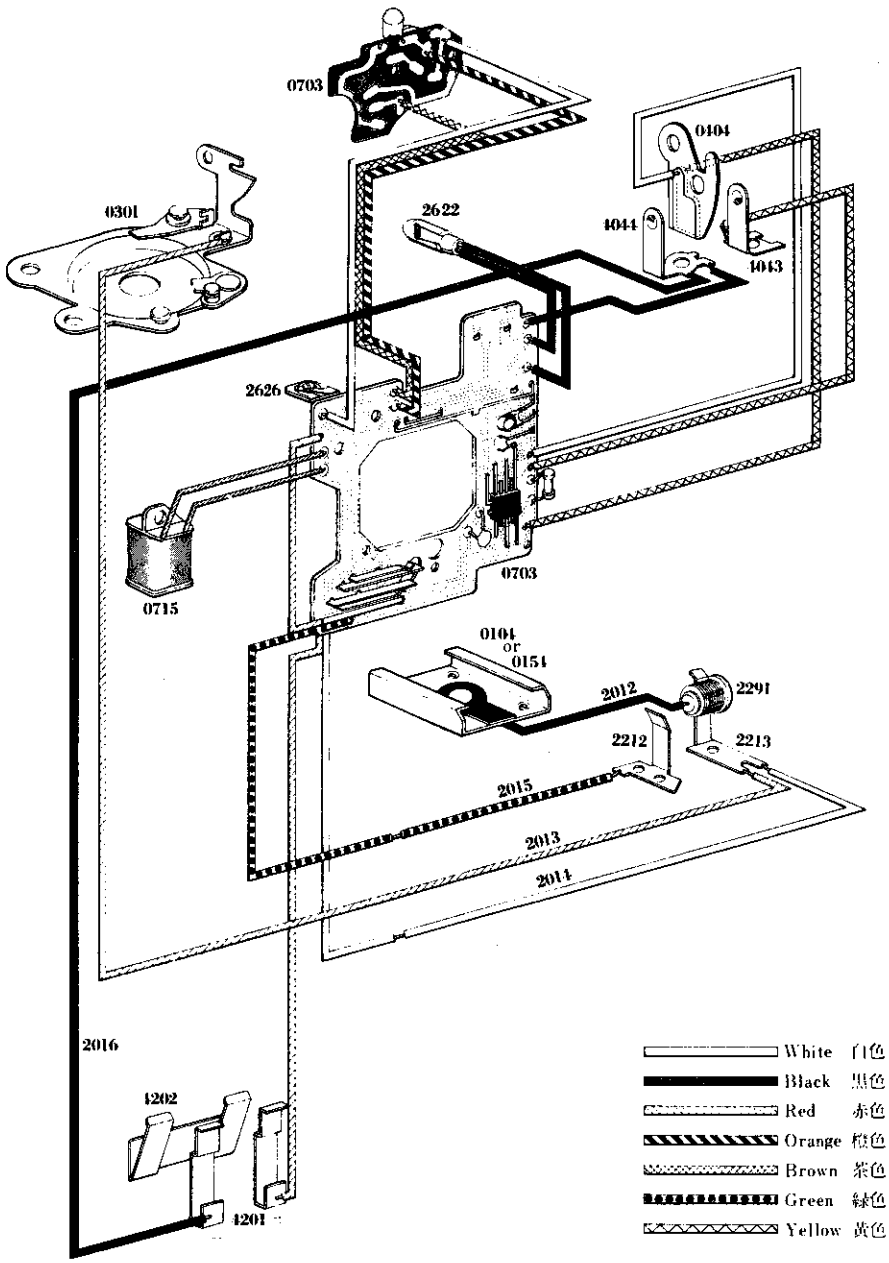
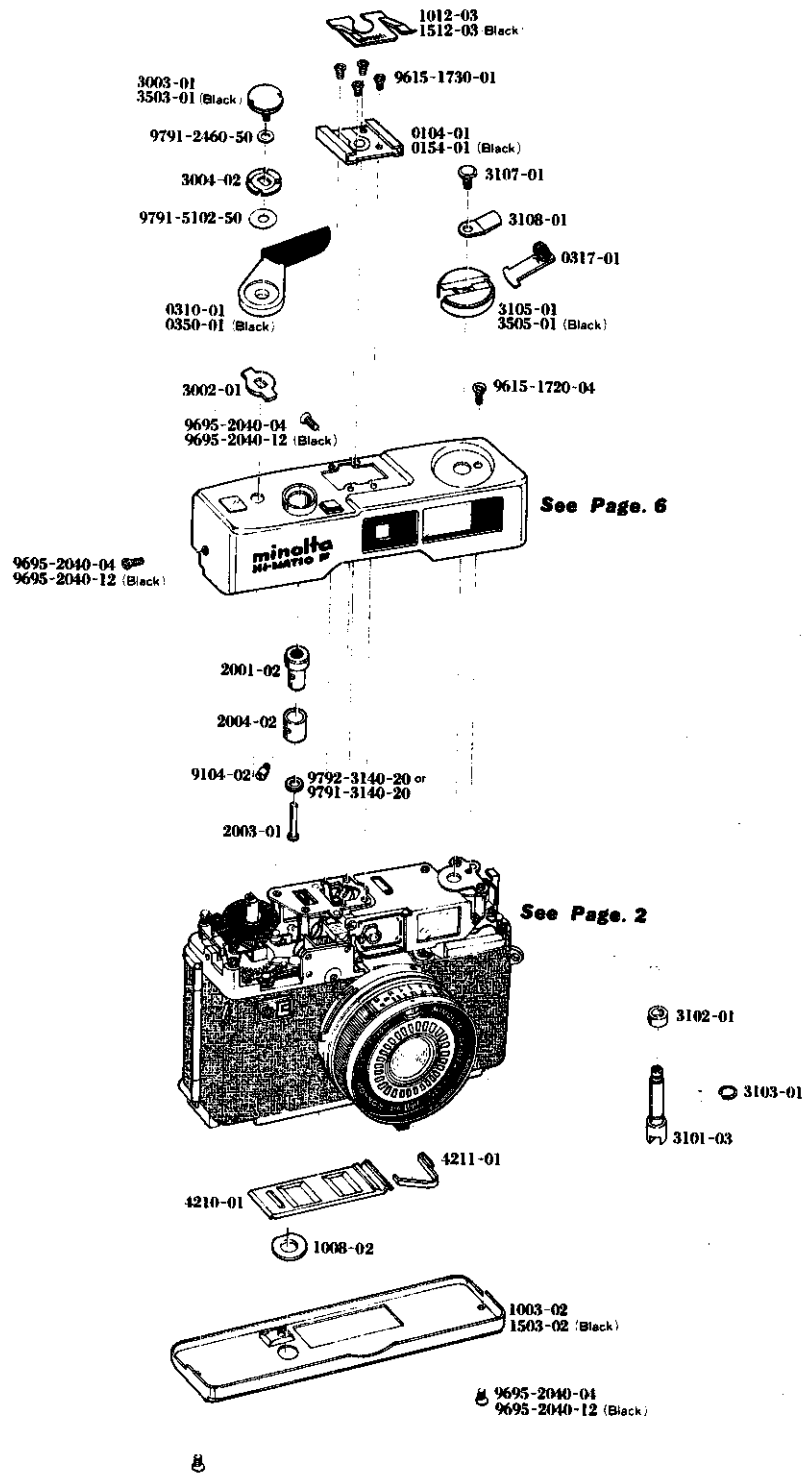
Wiring Schematic Diagram

立 体 配 線 図



HI-MATIC F
CODE No. 168



Part No. 部品番号	Part Name 部 品 名 称	Unit 員数
0104-01	Accessory clip set アクセサリークリップセット	1
0154-01	Accessory clip set (Black) アクセサリークリップセット（黒）	1
0310-01	Film advance lever set 巻上げレバーセット	1
0317-01	Film rewind handle set 巻戻しハンドルセット	1
0350-01	Film advance lever set (Black) 巻上げレバーセット（黒）	1
1003-02	Bottom cover 下カバー	1
1008-02	Tripod socket coller 三脚ねじカラー	1
1012-03	Accessory clip spring アクセサリーグリップばね	1
1503-02	Bottom cover (Black) 下カバー（黒）	1
1512-03	Accessory clip spring (Black) アクセサリークリップばね(黒)	1
2001-02	Shutter release button シャッター釦	1
2003-01	Shutter release button axis シャッター釦芯	1
2004-02	Shutter release button ring シャッター釦スリーブ	1
3002-01	Film advance lever coupling washer 巻上げレバー結合子	1
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3004-02	Film advance lever spring washer 巻上げレバースプリングワッシャー	1
3101-03	Film rewind axis 巻戻し軸	1
3102-01	Film rewind axis coller 巻戻し軸カラー	1
3103-01	Film rewind axis coller stopper 巻戻し軸カラー止め	1
3105-01	Film rewind knob 巻戻しノブ	1
3107-01	Film rewind knob screw 巻戻しノブビス	1
3108-01	Film rewind handle spring 巻戻しハンドルばね	1
3503-01	Film advance lever pressure (Black) 巻上げレバー押え（黒）	1
3505-01	Film rewind knob (Black) 巻戻しノブ（黒）	1
4210-01	Battery compartment cover 電池蓋	1
4211-01	Battery compartment cover lock spring 電池蓋ロックスプリング	1
9104-02	Shutter release button guide screw シャッター釦ガイドビス	1
9615-1720-04	Phillips type screw 十字穴付き皿頭小ねじ	1
9615-1730-01	Phillips type screw 十字穴付き皿頭小ねじ	4
9695-2040-04	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	4
9695-2040-12	Phillips type tapping screw (Black) 十字穴付き皿頭タッピンねじ(黒)	4
9791-2460-50	Washer 薄ワッシャー	1
9791-3140-20	Washer 薄ワッシャー	1
9791-5102-50	Washer 薄ワッシャー	1
9792-3140-20	Washer 薄ワッシャー	1

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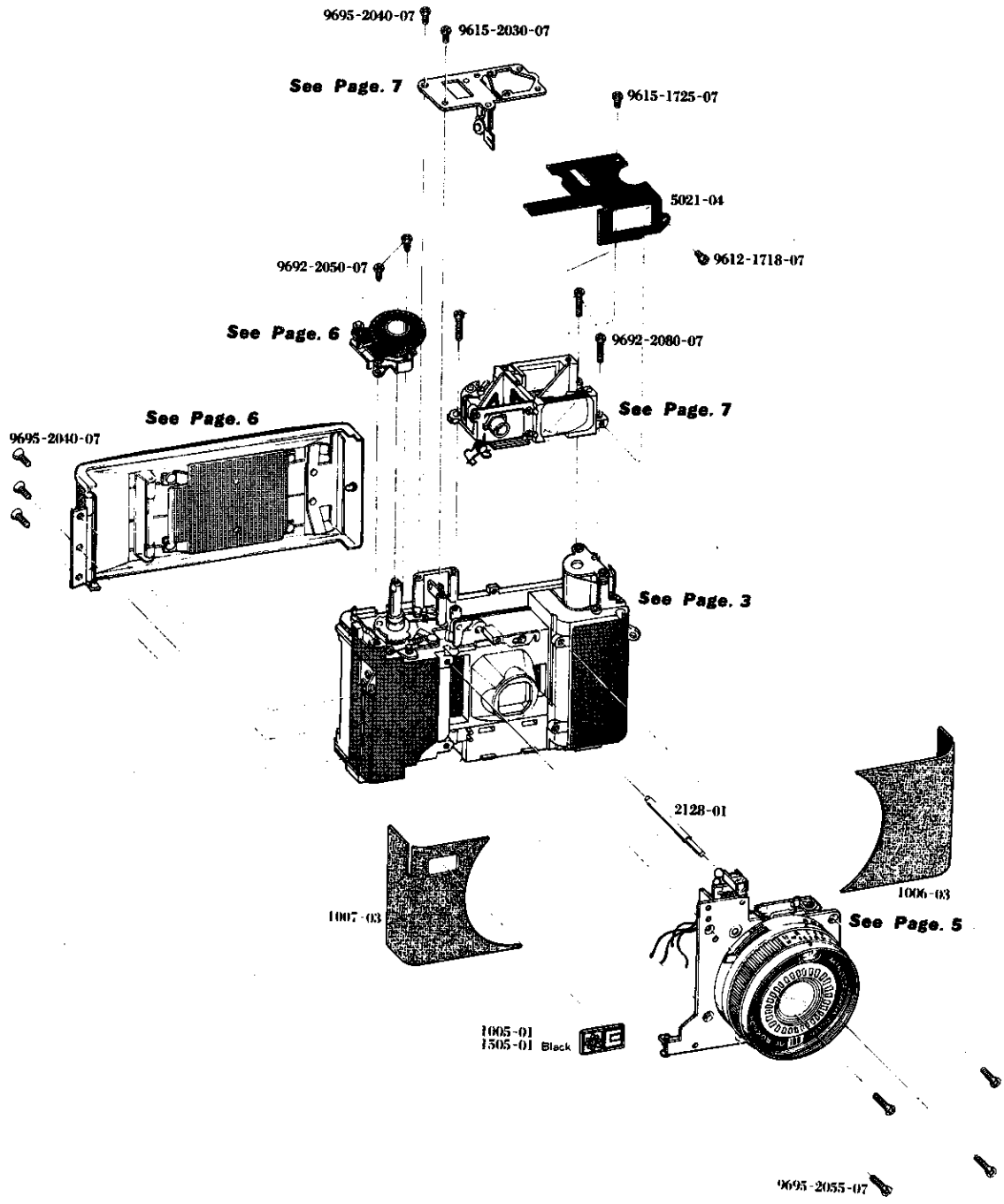

Part No. 部品番号	Part Name 部品名称	Unit 員数
1005-01	Front decoration name plate 前板飾り銘板	1
1006-03	Body leather-A ボデー貼皮-A	1
1007-03	Body leather-B ボデー貼皮-B	1
1505-01	Front decoration name plate (Black) 前板飾り銘板(黒)	1
2128-01	Range finder operation pin 距離連動ピン	1
5021-04	Finder cover 遮光板	1
9612-1718-07	Phillips type screw 十字穴付きなべ小ねじ	1
9615-1725-07	Phillips type screw 十字穴付き皿頭小ねじ	1
9615-2030-07	Phillips type screw 十字穴付き皿頭小ねじ	1
9692-2050-07	Phillips type tapping screw 十字穴付きなべ頭タッピンねじ	2
9692-2080-07	Phillips type tapping screw 十字穴付きなべ頭タッピンねじ	3
9695-2040-07	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	4
9695-2055-07	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	4

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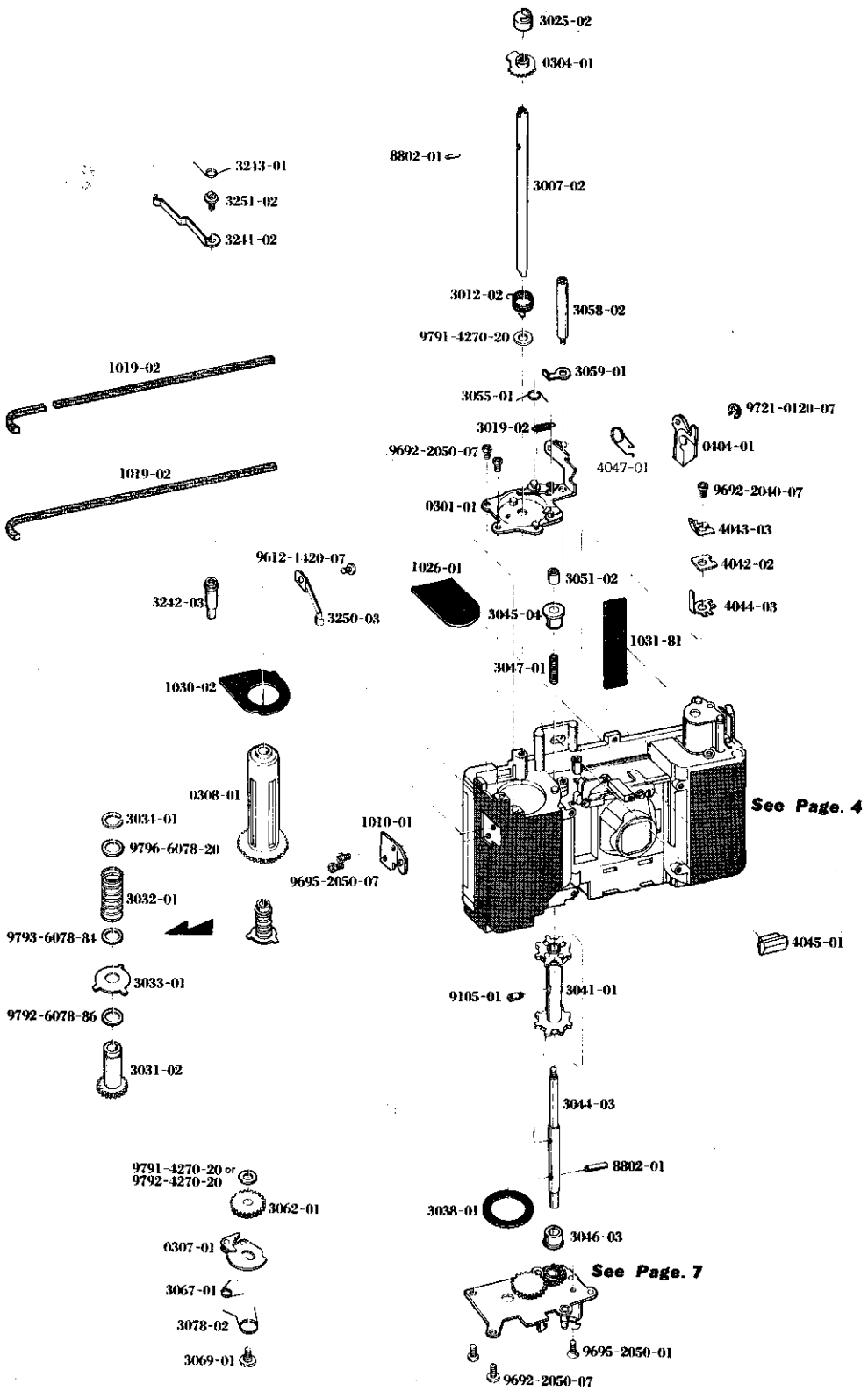

Part No. 部品番号	Part Name 部品名称	Unit 員数
0301-01	Upper base plate set 上部台板セット	1
4047-01	B.C. spring B.C. スプリング	1
0304-01	Film advance stop plate set 巻止め板セット	1
0307-01	Film advance operation plate set 巻上げ作動板セット	1
0308-01	Spool set スプールセット	1
0404-01	B.C. Contact plate set B.C. 接片台セット	1
1010-01	Strap hanger-B 吊環-B	1
1019-02	Body light shield sponge-A ボデー遮光紐-A	2
1026-01	Light shield plate 遮光板	1
1030-02	Body light shield plate-B 光線防止板	1
1031-81	Body support plate パトローネ室補正板	1
3007-02	Winding axis 巻取り軸	1
3012-02	Winding returning lever spring 巻上げ, 巻戻しレバースプリング	1
3019-02	Operation lever spring 操作レバースプリング	1
3025-02	Counter cam カウンター送りカム	1
3031-02	Spool gear スプールギヤー	1
3032-01	Slide spring 滑りスプリング	1
3033-01	Spool nail スプール爪	1
3034-01	Slid spring set ring 滑りスプリング止め輪	1
3038-01	Light shield ring 光線洩れ防止板	1
3041-01	Sprocket スプロケット	1
3044-03	Sprocket axis スプロケット軸	1
3045-04	Sprocket axis receiver (Upper) スプロケット軸受 (上)	1
3046-03	Sprocket axis receiver (Lower) スプロケット軸受 (下)	1
3047-01	Sprocket axis spring スプロケット軸スプリング	1
3051-02	Sprocket axis nut 押し止めナット	1
3055-01	Sprocket axis spring 押し止めレバースプリング	1
3058-02	Signal lever plate set axis 信号レバー台取付け柱	1
3059-01	Lug plate ラグ板	1
3062-01	Winding gear 巻上げ送りギヤー	1
3067-01	Film advance operation plate spring 送り爪スプリング	1
3069-01	Film advance operation plate set screw 巻上げ作動板止めビス	1
3078-02	Charge spring チャージスプリング	1
3241-02	Express film lever フィルム表示レバー	1
3242-03	Express filler axis 表示フィラー軸	1
3243-01	Express filler axis spring フィラー軸スプリング	1
3250-03	Express filler 表示フィラー	1
3251-02	Express filler lever screw 表示レバービス	1
4042-02	B.C. Isolation plate B.C. 絶縁板	1
4043-03	B.C. Contact-A B.C. 接片-A	1
4044-03	B.C. Contact-B B.C. 接片-B	1
4045-01	B.C. Button B.C. 釦	1
8802-01	Sprocket gear knock pin スプロケットギヤーノックピン	2
9105-01	Sprocket screw スプロケットビス	1
9612-1420-07	Phillips type screw 十字穴付きなべ頭小ねじ	1
9692-2040-07	Phillips type tapping screw 十字穴付きなべ頭タッピンねじ	1
9692-2050-07	Phillips type tapping screw 十字穴付きなべ頭タッピンねじ	4
9695-2050-01	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	1
9695-2050-07	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	2
9791-4270-20	Washer 薄ワッシャー	2
9792-4270-20	Washer 薄ワッシャー	1
9792-6078-86	Washer 薄ワッシャー	1
9793-6078-84	Washer 薄ワッシャー	1
9796-6078-20	Washer 薄ワッシャー	1
9721-0120-07	Coupling washer 割ワッシャー	1

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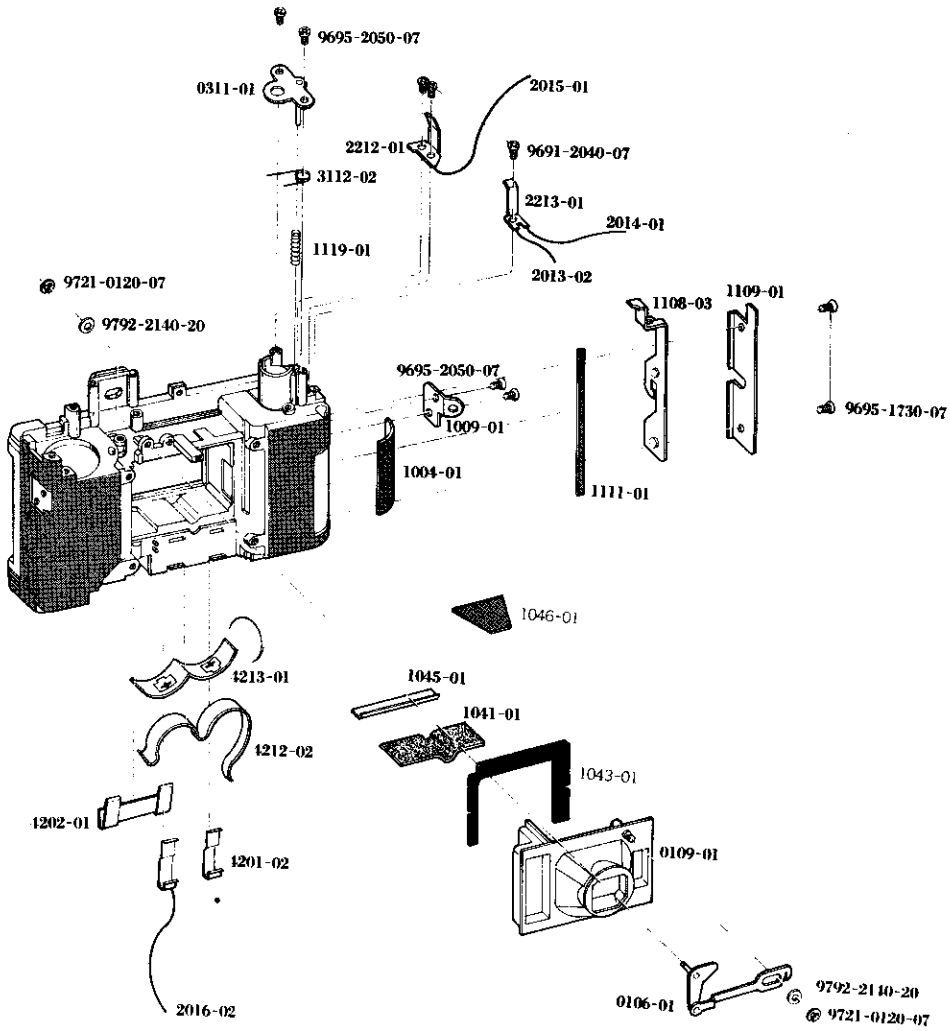

Part No. 部品番号	Part Name 部 品 名 称	Unit 員数
0106-01	FM change plate set 切替板セット	1
0109-01	Light shield cover set 遮光筒セット	1
1043-01	Light shield frame 遮光枠	1
1046-01	Reflecting shield sheet-B 反射防止用植毛紙-B	1
0311-01	Rewinding plate set 巻戻し台板セット	1
1004-01	Body sheet ボデー貼付け片	1
1009-01	Strap hanger-A 吊環-A	1
1041-01	Reflecting shield sheet 反射防止用植毛紙	1
1045-01	Position plate 植毛紙位置決め板	1
1108-03	Body side lock plate ボデー側閉金	1
1109-01	Lock cover 閉金覆い板	1
1111-01	Lock guide plate 閉金ガイド板	1
1119-01	Lock spring 閉金ロックスプリング	1
2013-02	Earth lead wire (Red) アートリード線（赤）	1
2014-01	Sync. lead wire-A (White) シンクロリード線-A（白）	1
2015-01	Sync. lead wire-B (Green) シンクロリード線-B（緑）	1
2016-02	Battery lead wire (Black) 電池リード線（黒）	1
2212-01	Sync. contact シンクロ接片	1
2213-01	Earth contact アース接片	1
3112-02	Rewind axis click spring 巻戻し軸クリックスプリング	1
4201-02	Battery contact plate-A 電池極板-A	2
4202-01	Battery contact plate-B 電池極板-B	1
4212-02	Battery vinyl 電池取出し帯	1
4213-01	Battery name plate 電池銘板	1
9691-2040-07	Phillips type tapping screw 十字穴付き丸頭タッピンねじ	3
9695-1730-07	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	2
9695-2050-07	Phillips type tapping screw 十字穴付き皿頭タッピンねじ	4
9792-2140-20	Washer 薄ワッシャー	2
9721-0120-07	Coupling washer 割ワッシャー	2

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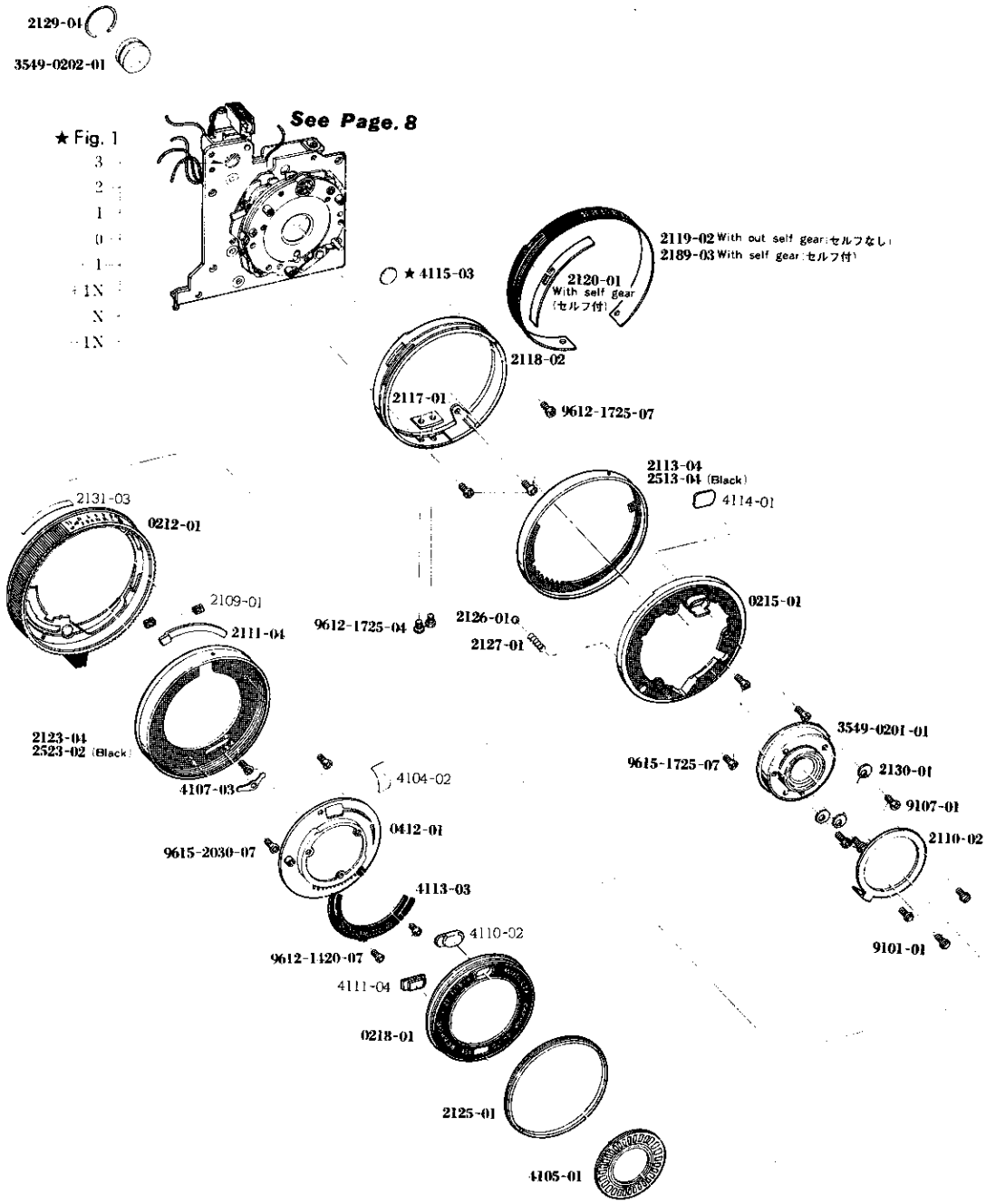

★Caution: Be sure to check stamp mark as illustrated in the Fig. 1. If stamp mark the +1N, N or-N, bond 4115 to the Front on CdS cell. Set must be used the 4115 combination together. (If forget to bond the 4115 on CdS, can not adjustment measurement.

★注意事項：Fig. 1のスタンプ記号を必ず確認し，＋1N，N，－1Nのものには，CdS受光部前面に4115を貼付けて下さい。(4115を貼忘れると調整不能となります。)

Part No. 部品番号	Part Name 部品名称	Unit 員数
0212-01	Distance ring set 距離リングセット	1
2109-01	Cam pressure 連動カム押え	2
2131-03	Distance ring adjusting plate 距離リングガタ防止板	1
0215-01	Guide ring set ガイドリングセット	1
4114-01	Diffusion plate 拡散板	1
0218-01	Front decoration ring set 正面飾りリングセット	1
4110-02	CdS cell window 受光レンズ	1
4111-04	Film speed window 感度窓	1
0412-01	ASA slit plate set ASAスリット板セット	1
4104-02	ND filter 固定NDフィルター	1
3549-0201-01	Front lens group set レンズ前玉群セット	1
3549-0202-01	Rear lens group set レンズ後玉群セット	1
2110-02	Focusing ring 繰出しリング	1
2111-04	Range finder operation cam 距離計連動カム	1
2113-04	GN. ring GN. リング	1
2117-01	Lock set plate ロック取付板	1
2118-02	Set ring 固定リング	1
2119-02	GN plate (with out self gear) 指標板（セルフギヤーなし用）	1
2120-01	Self cover (with self gear) セルフカバー（セルフギヤー付き用）	1
2123-04	Filter ring 附属品取付リング	1
2125-01	Decoration ring 飾り環ナット	1
2126-01	GN. ring click ball GN. クリックボール	1
2127-01	GN. ring click spring GN. クリックスプリング	1
2129-04	Rear lens pressure 後玉押え	1
2130-01	Helicoid washer ヘリコイド座金	3
2189-03	GN. plate (with self gear) 指標板（セルフ付き用）	1
2513-04	GN. ring (Black) GN. リング（黒）	1
2523-02	Filter ring (Black) 附属品取付リング（黒）	1
4105-01	ASA change ring ASA切換リング	1
4107-03	ASA ring click spring ASAクリックスプリング	1
4113-03	ASA plate ASA目盛板	1
4115-03	ND Filter-A NDフィルター-A	1
9101-01	Focusing ring set screw 繰出しリング押え	3
9107-01	Helicoid set screw ヘリコイド止めビス	3
9612-1420-07	Phillips type screw 十字穴付きなべ頭小ねじ	2
9612-1725-04	Phillips type screw 十字穴付きなべ頭小ねじ	2
9612-1725-07	Phillips type screw 十字穴付きなべ頭小ねじ	3
9615-1725-07	Phillips type screw 十字穴付き皿頭小ねじ	3
9615-2030-07	Phillips type screw 十字穴付き皿頭小ねじ	3

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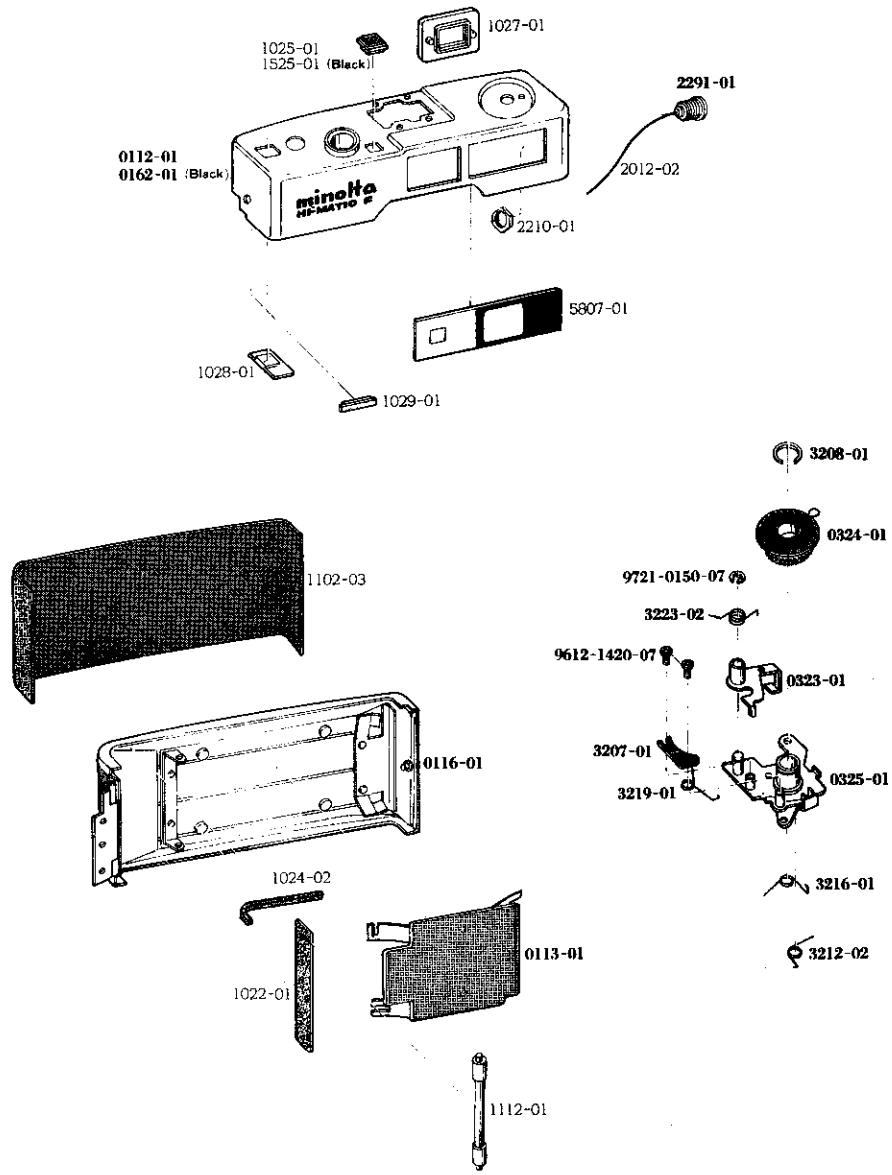

Part No. 部品番号	Part Name 部品名称	Unit 員数
0112-01	Top cover set 上カバーセット	1
1025-01	Lamp window ランプ窓	1
1027-01	Eye-piece frame 接眼枠	1
1028-01	Counter window カウンター窓	1
1029-01	SLS window SLS窓	1
2012-02	Top cover lead wire (Black) 上カバーリード線 (黒)	1
5807-01	Window glass 窓ガラス	1
0113-01	Pressure plate set 圧着板セット	1
0116-01	Back cover set 裏蓋セット	1
1022-01	Back cover light shield sponge 裏蓋遮光片	1
1024-02	Back cover light shield sponge-B 裏蓋遮光紐-B	1
1102-03	Back cover leather 裏蓋貼皮	1
1112-01	Film press roller フィルム押えローラー	1
0162-01	Top cover set (Black) 上カバーセット (黒)	1
1027-01	Eye-piece frame 接眼枠	1
1028-01	Counter window カウンター窓	1
1029-01	SLS window SLS窓	1
1525-01	Lamp window (Black) ランプ窓 (黒)	1
2012-02	Top cover lead wire (Black) 上カバーリード線 (黒)	1
5807-01	Window glass 窓ガラス	1
0323-01	Zero return lever set ゼロ戻しレバーセット	1
0324-01	Counter dial set カウンターダイヤルセット	1
0325-01	Counter plate set カウンター台板セット	1
2291-01	Sync. terminal set シンクロターミナルセット	1
2210-01	Sync. terminal nut シンクロターミナル締付けナット	1
3207-01	Index plate 指標板	1
3208-01	Dial pressure ring ダイヤル押えリング	1
3212-02	Counter ratchet lever spring 送りレバースプリング	1
3216-01	Counter ratchet nail spring 送り爪スプリング	1
3219-01	Reverse prevent spring 逆転止めスプリング	1
3223-02	Zero return spring ゼロ戻しスプリング	1
9612-1420-07	Phillips type screw 十字穴付きなべ頭小ねじ	2
9721-0150-07	Coupling washer 割ワッシャー	1

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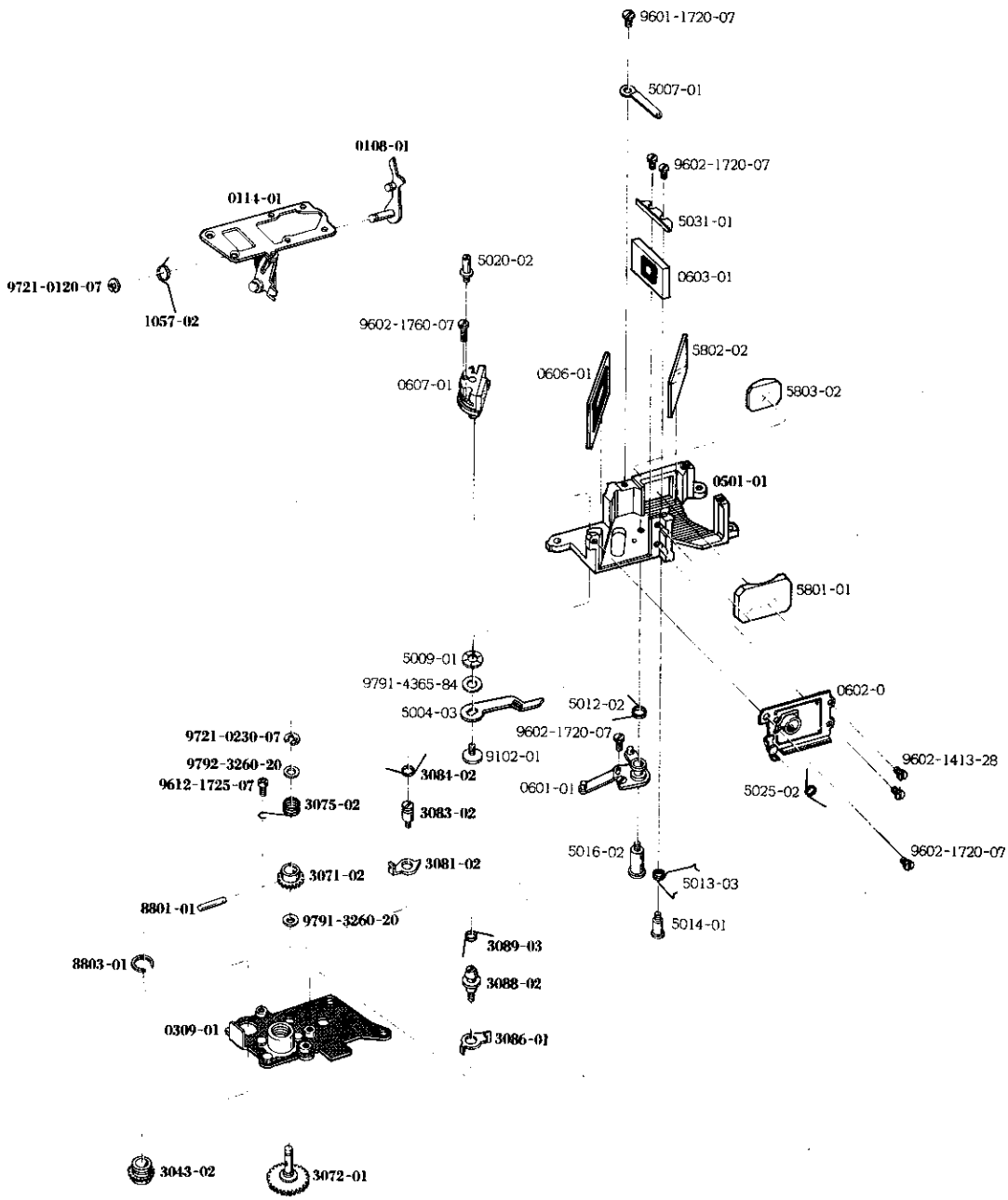

Part No. 部品番号	Part Name 部品名称	Unit 員数
0108-01	Signal lever set 信号レバーセット	1
0114-01	Accessory clip plate set アクセサリシュー取付け台セット	1
0309-01	Winding plate set 下部台板セット	1
0501-01	Range finder set 距離計セット	1
0601-01	Main lever set 連動レバーセット	1
0602-01	Finder frame set 視野枠セット	1
0603-01	Frame lens set 複合レンズセット	1
0606-01	Reflection mirror set 反射鏡セット	1
0607-01	Range mirror set 測距ミラーセット	1
5004-03	Range lever 測距レバー	1
5007-01	Frame lens pressure plate 複合レンズ押え	1
5009-01	Spring washer-B スプリングワッシャー-B	1
5012-02	Main lever spring 連動レバースプリング	1
5013-03	Range lever spring 測距レバースプリング	1
5014-01	Range lever spring axis 測距レバースプリング軸	1
5016-02	Main lever axis 連動レバー軸	1
5020-02	Range holder set screw 測距ホルダーセットビス	1
5025-02	Flush mark cover plate spring フラッシュマーク覆い板スプリング	1
5031-01	Ghost shield plate ゴースト防止板	1
5801-01	Objective lens 対物レンズ	1
5802-02	Half mirror 半透明鏡	1
5803-02	Eye-piece lens 接眼レンズ	1
9102-01	Range lever pressure screw 測距レバー押えビス	1
9601-1720-07	Screw 平小ねじ	1
9602-1413-28	Screw 平小ねじ	2
9602-1720-07	Screw 平小ねじ	4
9602-1760-07	Screw 平小ねじ	1
9791-4365-84	Washer 薄ワッシャー	1
1057-02	Signal lever spring 信号レバースプリング	1
3043-02	Sprocket gear スプロケットギヤー	1
3071-02	Idle gear-A アイドルギヤー-A	1
3072-01	Idle gear-B アイドルギヤー-B	1
3075-02	Kick spring キックスプリング	1
3081-02	Winding stop middle lever 巻止め中間レバー	1
3083-02	Winding stop middle lever axis 巻止め中間レバー軸	1
3084-02	Winding stop middle lever spring 巻止め中間レバースプリング	1
3086-01	Winding stop lever 巻止めレバー	1
3088-02	Winding stop lever axis 巻止めレバー軸	1
3089-03	Winding stop lever spring 巻止めレバースプリング	1
8801-01	Idle gear pin アイドルギヤー結合ピン	1
8803-01	Sprocket gear set ring スプロケットギヤー止め輪	1
9612-1725-07	Phillips type screw 十字穴付きなべ頭小ねじ	1
9791-3260-20	Washer 薄ワッシャー	1
9792-3260-20	Washer 薄ワッシャー	1
9721-0120-07	Coupling washer 割ワッシャー	1
9721-0230-07	Coupling washer 割ワッシャー	1

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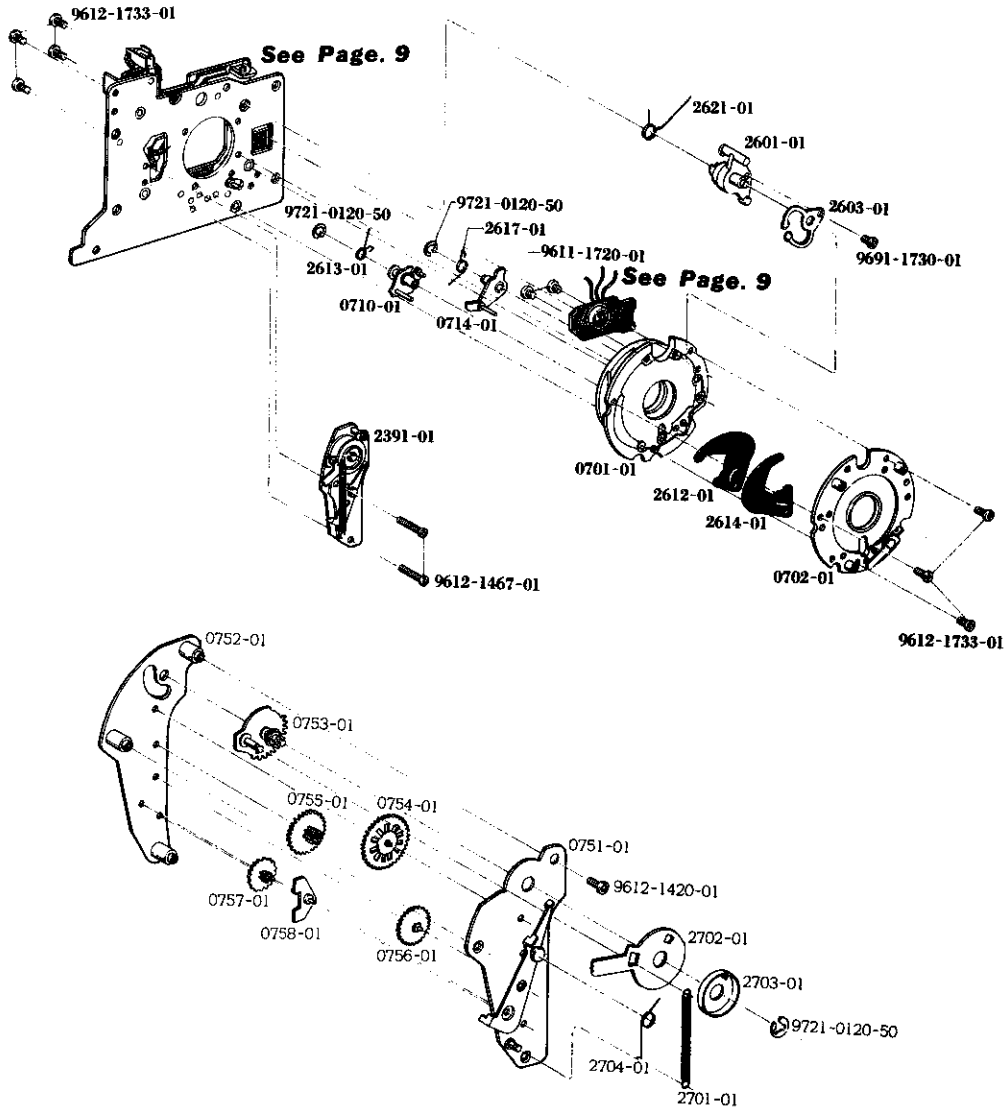
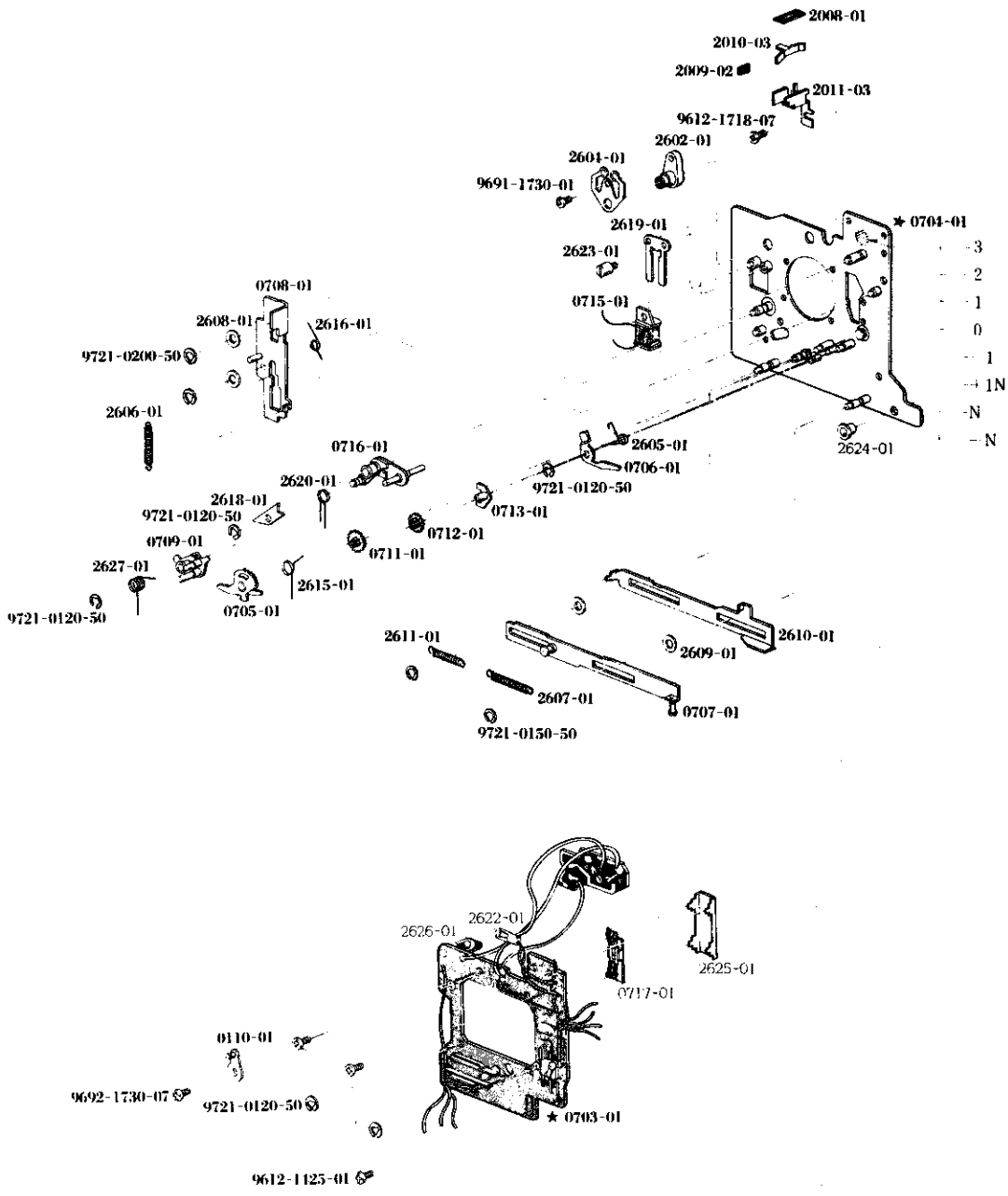


Part No. 部品番号	Part Name 部品名称	Unit 員数
0701-01	Outer frame set 外枠セット	1
0702-01	Front plate set 前板セット	1
0710-01	Kick lever set ケリ枠セット	1
0714-01	Cam lever set 絞りカムレバーセット・	1
2391-01	Self-gear set セルフギヤーセット	1
0751-01	VG Upper plate VG上板セット	1
0752-01	VG Lower plate VG下板セット	1
0753-01	VG First gear VG1番ギヤーセット	1
0754-01	VG Second gear VG2番ギヤーセット	1
0755-01	VG Third gear VG3番ギヤーセット	1
0756-01	VG Fourth gear VG4番ギヤーセット	1
0757-01	VG Escape wheel set VGガンギ車セット	1
0758-01	VG Anchor set VGアンクルセット	1
2701-01	VG First gear spring VG1番ギヤースプリング	1
2702-01	VG Set lever VGセットレバー	1
2703-01	VG First gear spring holder VG1番ギヤースプリング受け	1
2704-01	VG Lock plate spring VGロック板スプリング	1
9612-1420-01	Phillips type tapping screw 十字穴付きなべ頭小ねじ	1
9721-0120-50	Coupling washer 割ワッシャー	1
2601-01	Changing switch axis-A 切換軸-A	1
2603-01	Changing switch axis-B 切換接片-A	1
2612-01	Shutter blade-A 露出羽根-A	1
2613-01	Kick lever spring ケリ枠スプリング	1
2614-01	Shutter blade-B 露出羽根-B	1
2617-01	Cam lever spring 絞りカムレバースプリング	1
2621-01	Changing switch axis spring 切換軸スプリング	1
9611-1720-01	Phillips type screw 十字穴付きなべ頭小ねじ	2
9612-1467-01	Phillips type screw 十字穴付きなべ頭小ねじ	2
9612-1733-01	Phillips type screw 十字穴付きなべ頭小ねじ	7
9691-1730-01	Phillips type tapping screw 十字穴付き丸頭タッピンねじ	1
9721-0120-50	Coupling washer 割ワッシャー	2

HI-MATIC F
CODE No. 168



★Caution: When replaceing part 0703, see section 12 of "HOW TO ADJUST" on Page 8 ; disreg stamp mark on 0704.

★注意事故：0703を取換える時は0704のスタンプ記号は無視して，調整編P. 8．12の順序で調整して下さい。

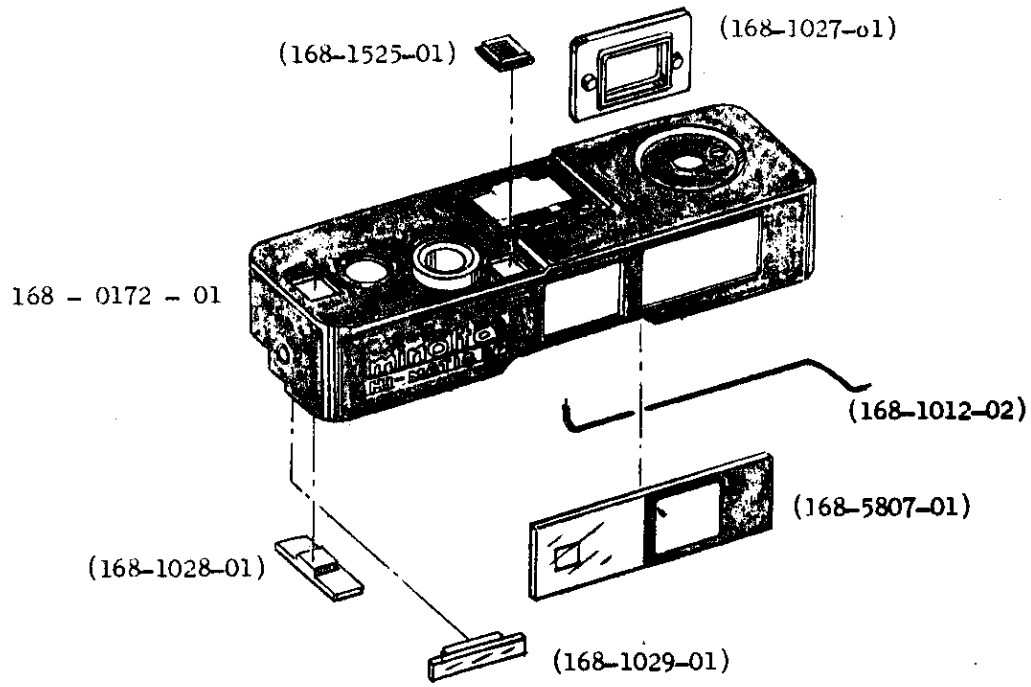
Part No. 部品番号	Part Name 部品名称	Unit 員数
0110-01	FM Changing lever set 切替えレバーセット	1
0703-01	Printed base plate set 回路基板セット	1
0717-01	Slide plate set スライド板	1
2622-01	Signal lamp ランプ	1
2625-01	Slide plate cover 案内板	1
2626-01	Valiable resistor 半固定抵抗	1
0704-01	Shutter base plate set シャッター台板セット	1
2624-01	Charge plate set receiver チャージ板受けピン	1
0705-01	Charge lever set チャージレバーセット	1
0706-01	Lever stopper レバー引掛爪セット	1
0707-01	Charge plate set チャージ板セット	1
0708-01	Release plate set レリーズ板セット	1
0709-01	Main lever set 主動レバーセット	1
0711-01	RG Second gear set RG2番ギヤーセット	1
0712-01	RG Escape wheel set RGガンギ車セット	1
0713-01	RG Anchor set RGアンクルセット	1
0715-01	Magnet coil set コイルセット	1
0716-01	Suction lever base set 鉄片レバーセット	1
2008-01	Light decrement filter 減光フィルター	1
2009-02	Lamp filter ランプフィルター	1
2010-03	Lamp press spring ランプ押えばね	1
2011-03	Lamp holder ランプホルダー	1
2602-01	Changing switch axis-B 切換軸-B	1
2604-01	Changing switch-B 切換接片-B	1
2605-01	Nail spring レバー引掛爪スプリング	1
2606-01	Release plate spring レリーズ板スプリング	1
2607-01	Charge plate spring チャージ板スプリング	1
2608-01	Washer-A ワッシャー-A（3φ）	2
2609-01	Washer-B ワッシャー-B（2φ）	2
2610-01	Winding release plate 巻上げ解除板	1
2611-01	Winding release plate spring 巻上げ解除板スプリング	1
2615-01	RG First gear RG1番ギヤースプリング	1
2616-01	VG Operation plate spring VG連動板スプリング	1
2618-01	Suction lever 可動鉄片	1
2619-01	Magnet core 鉄心	1
2620-01	Suction lever spring 鉄片レバースプリング	1
2623-01	Magnet set screw マグネット止めねじ	1
2627-01	Winding release plate spring 巻上げ解除板スプリング	1
9612-1425-01	Phillips type screw 十字穴付きなべ頭小ねじ	3
9612-1718-07	Phillips type screw 十字穴付きなべ頭小ねじ	1
9691-1730-01	Phillips type tapping screw 十字穴付き丸頭タッピンねじ	1
9692-1730-07	Phillips type tapping screw 十字穴付きなべ頭タッピンねじ	1
9721-0120-50	Coupling washer 割ワッシャー	5
9721-0150-50	Coupling washer 割ワッシャー	2
9721-0200-50	Coupling washer 割ワッシャー	2

HI-MATIC FP 専用部品表
(CODE NO. 168-700…輸出用)

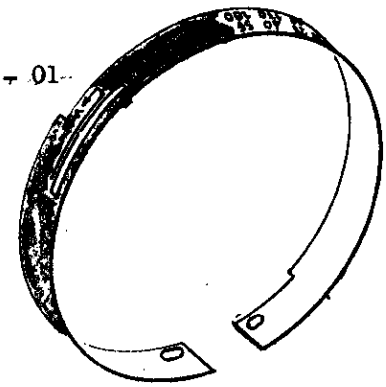
1. HI-MATIC FP は従来の 168-500 (HI-MATIC F…輸出用のブラックタイプ°) に セルフタイマーが追加され，輸出専用でブラック仕様のみとなっております。

2. 次頁の 168-700 専用部品以外の外装部品，一般部品，及びセルフギヤー関係部品はすべて 168-600 (国内用のブラックタイプ°) と共通ですのでそれらの部品に関してはすでに配布済の 168 パーツリストをご参照下さい。

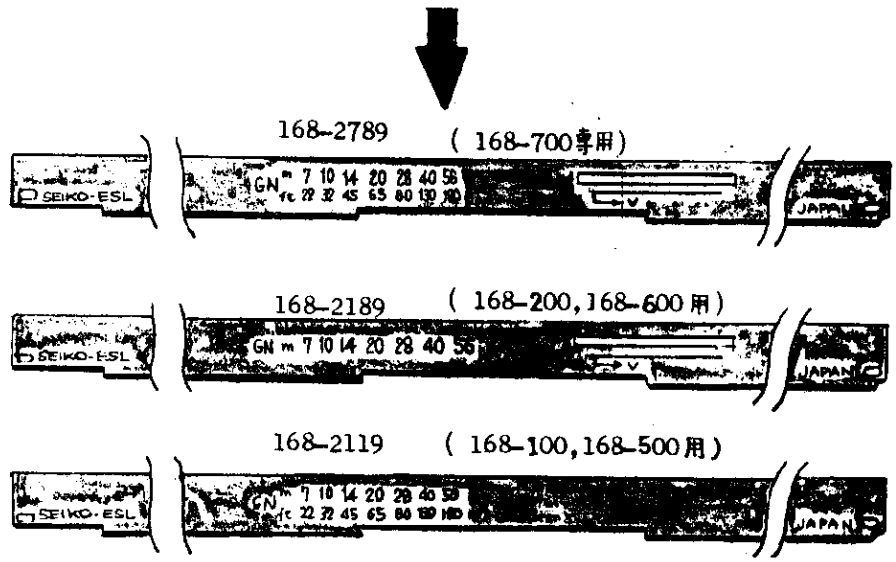
—— この専用部品表は 168 パーツリストにはめ込んでご使用下さい ——



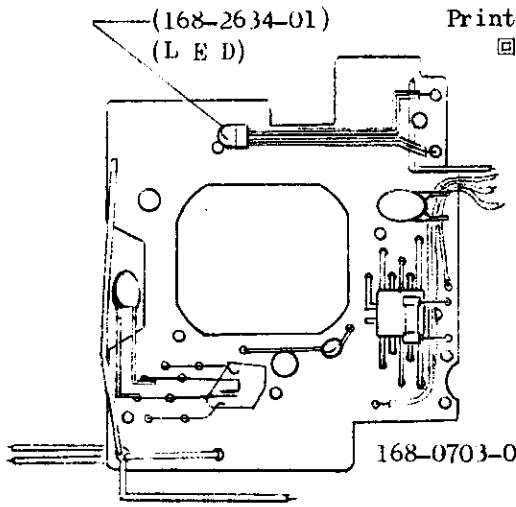
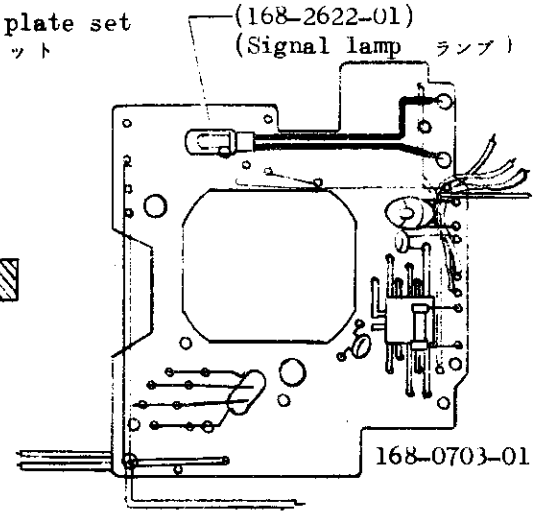
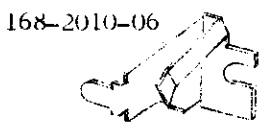
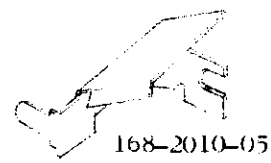
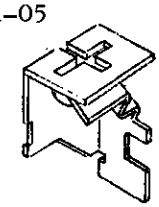
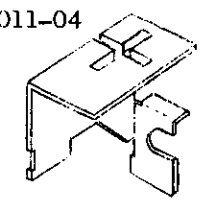
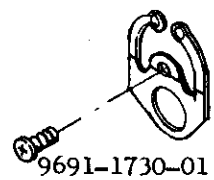
* 168 - 2789 - 01

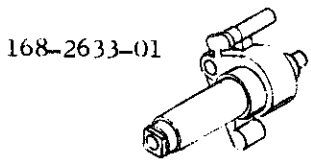
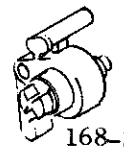
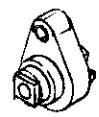


※ G.N Plate (指標板) には下の参考図のように他にも種類がありますので部品注文の際は特に注意願います。



1 Modifide Parts List (Modification of warning lamp switching mechanism)
警告ランプ点灯機構の変更による変更部品表

New Type Parts 新部品	Old Type Parts 旧部品
(168-2634-01) (L E D) Printed base plate set 回路基板セット  168-0703-02	(168-2622-01) (Signal lamp ランプ)  168-0703-01
LED press spring LED押えばね  168-2010-06	Lamp press spring ランプ押えばね  168-2010-05
LED holder LEDホルダー  168-2011-05	Lamp holder ランプホルダー  168-2011-04
Abolition 廃 止	Changing switch-B 切換接片B  168-2604-01 9691-1730-01 Phillips type tapping screw 十字穴付きなべ頭タッピンねじ

New Type Parts　新部品	Old Type Parts　旧部品
Changing switch axis 切換軸  168-2633-01	Changing switch axis-A 切換軸 A  168-2601-01 Changing switch axis-B 切換軸 B  168-2602-01

NOTE

1. When installing a new Printed base plate to the old model, remove all of the above old parts. However, in the case only the Changing switch (2604) is removed, the Changing switch axis-A & B (2601, 2602) can be used for the new Printed base plate set.

2. When the old Printed base plate is replaced with a new Printed base plate, the old model has the following changes;

1) Operation of the lamp (LED), when the shutter is released attaching a flash to the camera, as follows;
   Old type.....lamp comes on → lamp gose out
   New type.....LED comes on → goes out → comes on → goes out

2) When the bracket-type flash is used, operation of the flash changes.
   Old type.....Flash does not light up whether it is light or dark.
   New type....When it is more than about EV7.9, Flash does not light up.
   When it is less than about EV7.9, Flash lights up by Auto but the FM mechanism does not work and diaphragm is almost or entirely opend.

3) Especially for the black body, color of the lamp (LED) on the top cover changes from yellow to red.

注

1. 新旧部品の互換性はないので新回路基板を旧モデルに取付ける場合は上記部品表における旧部品を全部取外して新部品をセットで取付けて下さい。但し、2604を取外せば2601, 2602は旧基板に使用できます。
2. 旧基板を新基板に取換えた場合以下の項目が旧モデルと変わりますのでご注意下さい。
1) カメラにストロボをセットしてレリーズした際のランプ(LED)の点灯状態が変わる。
   旧基板……ランプ点灯→消灯
   新基板……LED点灯→消灯→点灯→消灯
2) ブラケットタイプのストロボを使用した場合発光の状態が変わる。
   旧基板……明るさに関係なしに発光しない。
   新基板……EV約7.9以上→発光せず。
   EV約7.9以下→発光するがFM機構は働かず絞りはほぼ開放～全開となる。
3) ブラックボデーの場合上カバー側のランプ(LED)表示が黄色から赤色になる。

Part NO. 部品番号	Part Name 部品名称	Unit 員数	共用関係
168 - 0172 - 01	Top cover set for 168-700　168-700用上カバー	1	168-700専用
(168-1525-01)	Lamp window　ランプ窓	(1)	168-500,600
(168-1027-01)	Eye-piece frame　接眼枠	(1)	168 全機種共用
(168-1028-01)	Counter window　カウンター窓	(1)	〃
(168-1029-01)	S L S window　SLS窓	(1)	〃
(168-2012-02)	Top cover lead wire (Black)　上カバーリード線(黒)	(1)	〃
(168-5807-01)	Window glass　窓ガラス	(1)	〃
168 - 2789 - 01	G.N. plate for 168-700　168-700用指標板	1	168-700専用

DISASSEMBLY

分　解　編

How to Disassemble

A. Top cover 1
B. Bottom cover 1
C. Rangefinder 3
D. Counter block 3
E. Shutter base plate block 3
F. Back cover block 3
G. Winding axis and Sprocket axis 5
H. Lens barrel block 7
I. Front lens block and Rear lens 7
J. Secter 9
K. Self-Gear 9
L. Shutter base plate 11
M. Back cover lock system 13

分　解　編

A. 上カバー 1
B. 下カバー 1
C. 距離計 3
D. カウンターブロック 3
E. シャッター台板ブロック 3
F. 裏ブタブロック 3
G. 巻取軸及びスプロケット軸 5
H. 鏡　胴 7
I. 前玉ブロック及び後玉 7
J. セクター 9
K. セルフギヤー 9
L. シャッター台板 11
M. 裏ブタロック機構 13

A. Top Cover Removal

1. Remove 3003, 3004, 0310 and 3002 in that order.
2. Open the back cover, insert tweezers in thegroove on 3101, and remove 0317 and 3105 by reversing them.
3. Take off 1012 with a screw driver's point, and remove four 9615-1730-01 and 0104.
4. Remove 9615-1720-04 and two 9695-2040-04, and take off 0112.
5. When taking off 0112, remove 2001, 2004 and 2003.

B. Bottom Cover Removal

1. Remove two 9695-2040-04, and take off 1003.
2. When removing 1003, also remove 4210 and 4211.
   Caution: When removing 4211, note its original position.

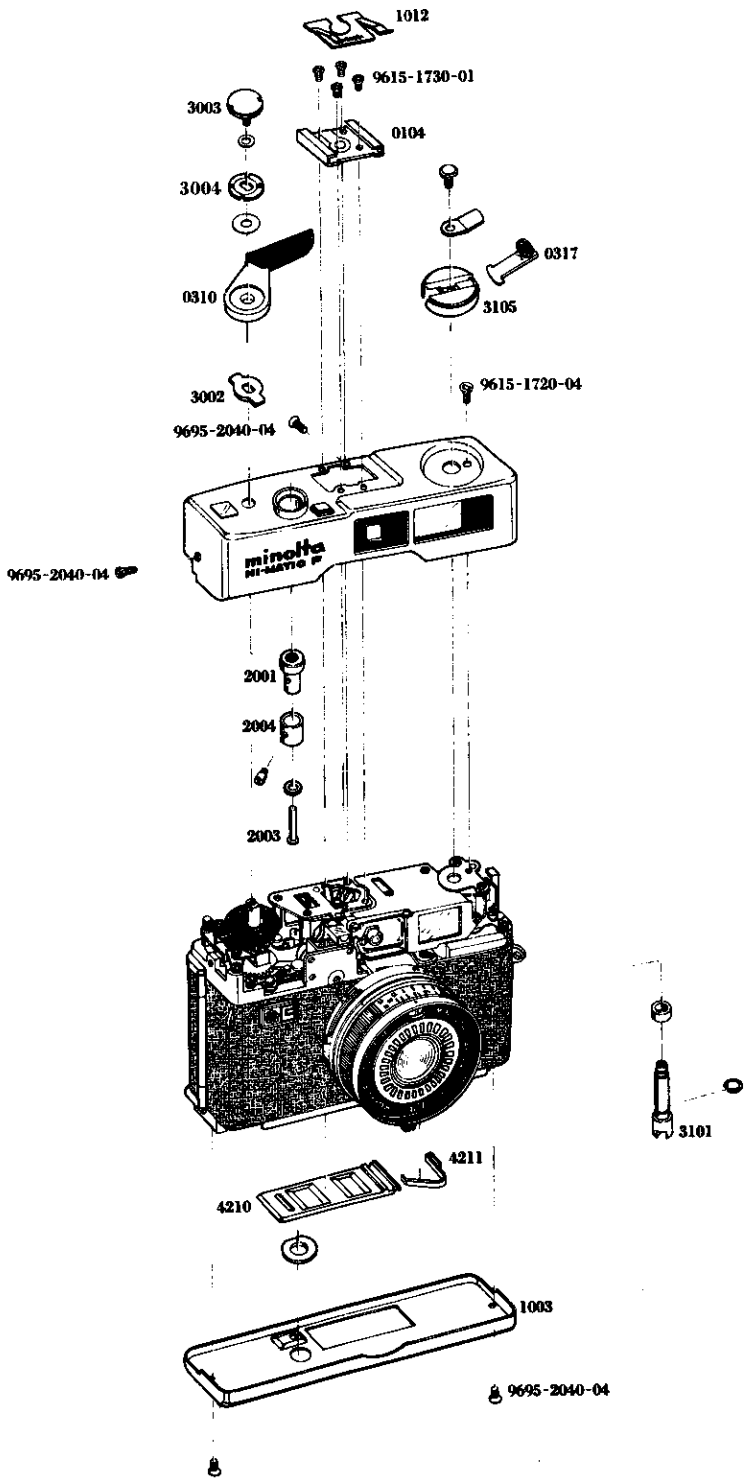
A. 上カバー取外し要領

1. 3003を外し，3004，0310，3002を取外す。
2. 裏ブタを開き，3101の割れ溝にピンセットを入れ，0317，3105を逆回転させ取外す。
3. 1012をドライバーの先で外し，9615-1730-01　4本を取外し，0104を取外す。
4. 9615-1720-04，9695-2040-04　2本を取外し，0112を取外す。
5. 0112を取外しの際，2001，2004，2003を取外す。

B. 下カバー取外し要領

1. 9695-2040-04　2本を外し，1003を取外す。
2. 1003取外しの際，4210，4211を取外す。
   取外し注意：　4211取外しの際，挿入位置を確認しておく。

Fig. 1


1012
9615-1730-01
3003
0104
3004
0317
0310
3105
3002
9615-1720-04
9695-2040-04
9695-2040-04
2001
2004
2003
3101
4211
4210
1003
9695-2040-04

C. Rangefinder Removal

1. Remove 9695-2040-07 and 9615-2030-07, and take off 0114.
2. Remove three 9692-2080-07, and take off the rangefinder.

D. Counter Block Removal

1. Remove two 9692-2050-07.
2. Remove the counter block.

E. Shutter Base Plate Block Removal

1. Remove the bonded 1006 and 1007.
2. As shown in Fig. 2, 3, unsolder the upper yellow (two wires), the white and Black lead wires as well as the lower red, green and white ones.
3. Remove four 9695-2055-07, and take off the shutter base plate block.
4. 2128 will now come off.

F. Back Cover Block Removal

1. Remove three 9695-2040-07, and take off the back cover block.

C. 距離計取外し要領

1. 9695-2040-07, 9615-2030-07を外し，0114を取外す。
2. 9692-2080-07　3本を外し，距離計ブロックを取外す。

D. カウンターブロック取外し要領

1. 9692-2050-07　2本を外す。
2. カウンターブロックを取外す。

E. シャッター台板ブロック取外し要領

1. のり付けの1006, 1007をはがす。
2. Fig. 2, 3のように，ボデー上面の黄(2本)，白，黒，ボデー底面の赤，緑，白のリード線のハンダ付けを外す。
3. 9695-2055-07　4本を外してシャッター台板ブロックを取外す。
4. 2128が外れる。

F. 裏ブタブロック取外し要領

1. 9695-2040-07　3本を外し，裏ブタブロックを取外す。

Fig. 2

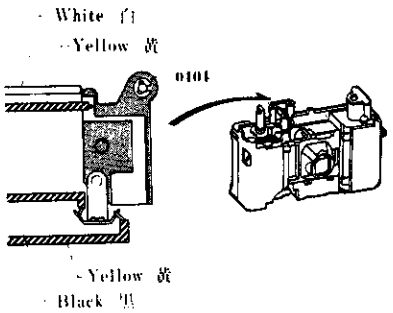


Fig. 3

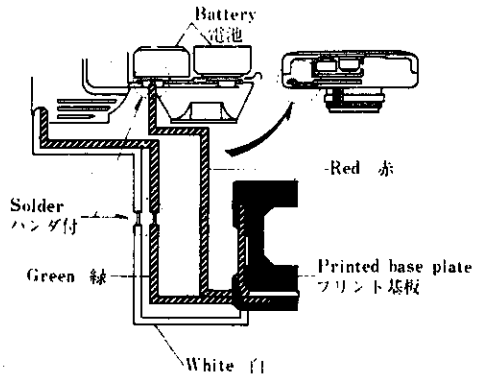
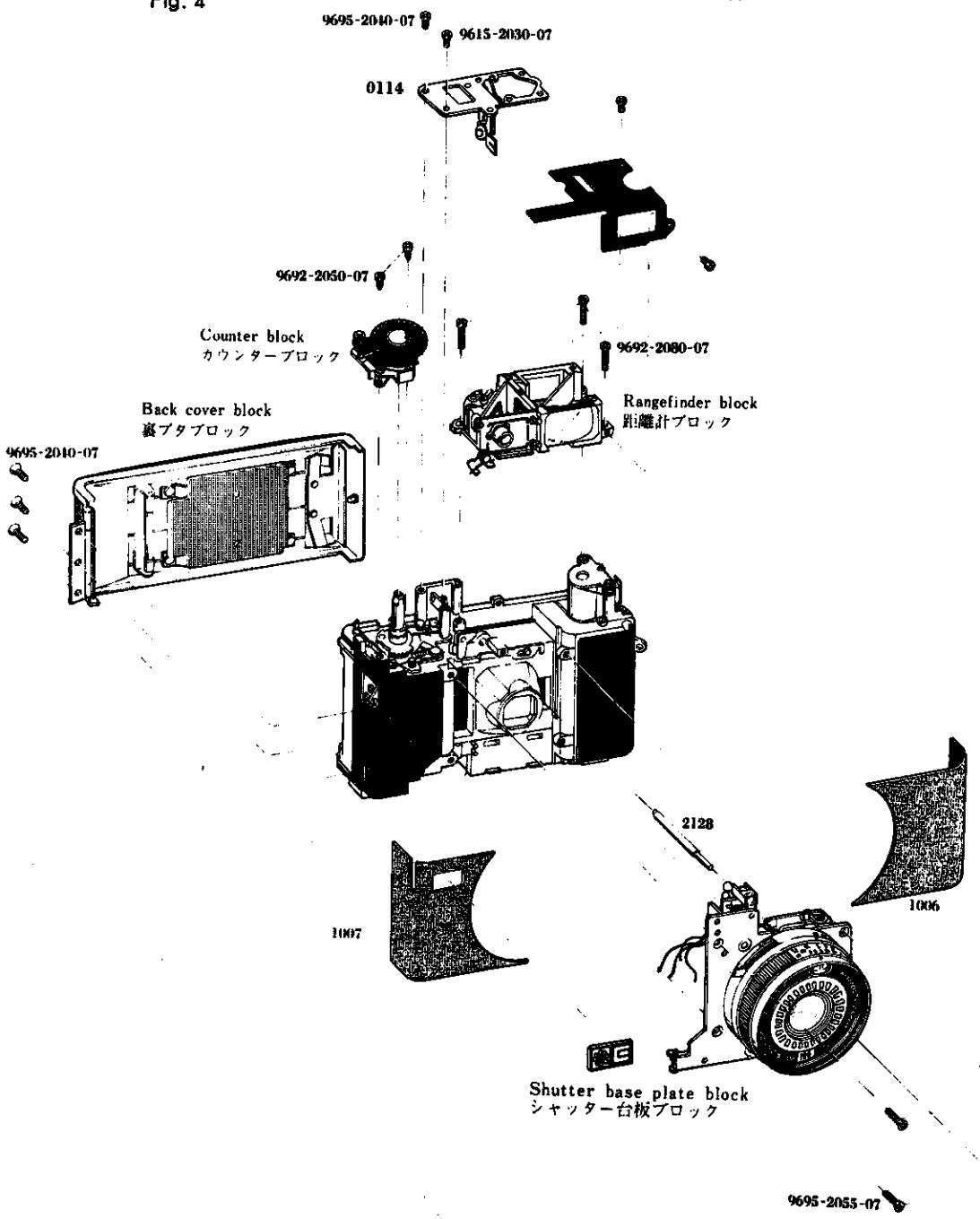


Fig. 4



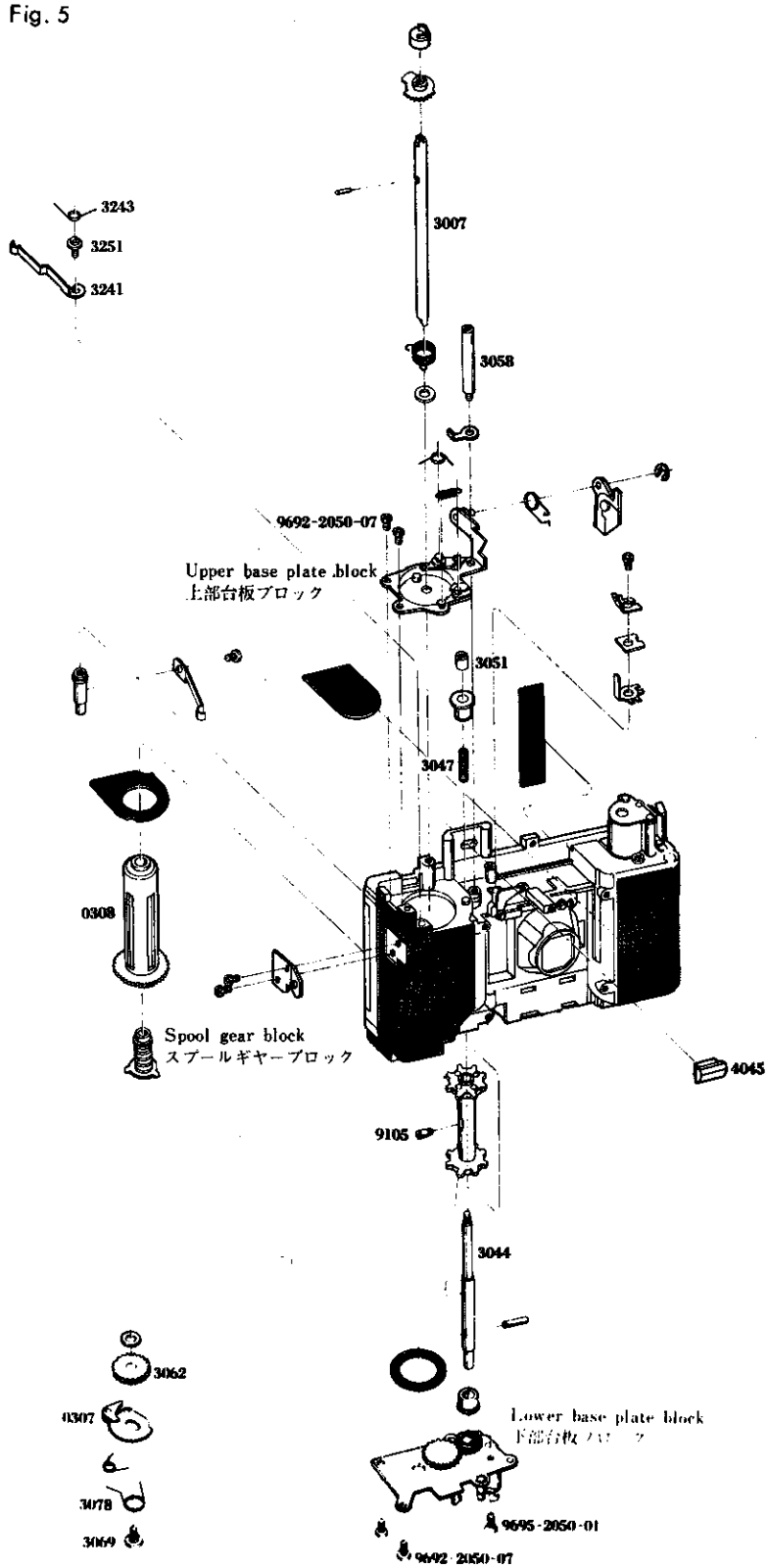
G. Winding Axis and Sprocket Axis Removal

1. Remove 3069 (left screw), and take off 3078, 0307 and 3062.
2. Remove 3007 upward.
3. Remove two 9692-2050-07 and 9695-2050-01, and take off the lower base plate block.
4. Remove 3251, 3241 and 3243 in that order.
5. Remove two 9692-2050-07 and 3058, and take off the upper base plate block. 4045 will now come off.
6. Remove 0308 as well as the spool gear block.
7. Remove 3051, 9105, 3044 and 3047 in that order.

G. 巻取軸及びスプロケット軸取外し要領

1. 3069（左ネジ）を外し，3078，0307，3062を取外す。
2. 3007を上方に取外す。
3. 9692-2050-07　2本，9695-2050-01を外し，下部台板ブロックを取外す。
4. 3251を外し，3241，3243を外す。
5. 9692-2050-07　2本，3058を外し，上部台板ブロックを取外す。
   4045が外れる。
6. 0308を取外し，スプールギヤーブロックを取外す。
7. 3051，9105を外し，3044，3047を取外す。

Fig. 5


3243
3251
3241
3007
3058
9692-2050-07
Upper base plate block
上部台板ブロック
3051
3047
0308
Spool gear block
スプールギヤーブロック
4045
9105
3044
3062
0307
3078
3069
Lower base plate block
9695-2050-01
9692-2050-07

H. Lens Barrel Removal

1. Remove 2125 using a universal compass.
2. 0218, 0412 and 4107 will come off.
3. Remove three 9615-2030-07, and take off 2123.
4. 0212 and 2111 will come off.
5. Remove three 9615-1725-07, and take off 0215, 2113, 2126 and 2127.
6. Remove three 9612-1725-07, and take off 2118.

I. Front Lens Block and Rear Lens

1. Remove three 9107, and take off the front lens block.
2. Remove three 9101, and take off 2110.
   Caution: When removing the front lens block, 2110 and the helicoid, note their original positions as well as the position where the helicoid comes off. (Fig. 7, 8, 9)
3. Remove 2129, and take off the rear lens.
   Caution: As indicated in Fig. 10, the end of 2129 is cut diagonally. Hence, remove this part first. When assembling, be sure this diagonally cut portion faces the bottom (the lens side).

H. 鏡胴取外し要領

1. 万能回螺器を使用して，2125を取外す。
2. 0218，0412及び4107が外れる。
3. 9615-2030-07　3本を外し，2123を取外す。
4. 0212，2111が外れる。
5. 9615-1725-07　3本を外し，0215，2113，2126，2127を取外す。
6. 9612-1725-07　3本を外し，2118を取外す。

I. 前玉ブロック及び後玉取外し要領

1. 9107　3本を外し，前玉ブロックを取外す。取付位置を確認する（Fig. 7）。
2. 9101　3本を外し，2110を取外す。
   注意事項：前玉ブロック，2110，ヘリコイドを取外す際に2110の取付け位置，ヘリコイド外れ位置を確認しておく（Fig. 8，9）。
3. 2129を外し，後玉を取外す。
   注意事項：2129にはFig. 10のように一端が斜めに切断されているので，この部分から外さなければならない。取付ける時も切断部が下側(レンズ側)になるように取付ける。

Fig. 6

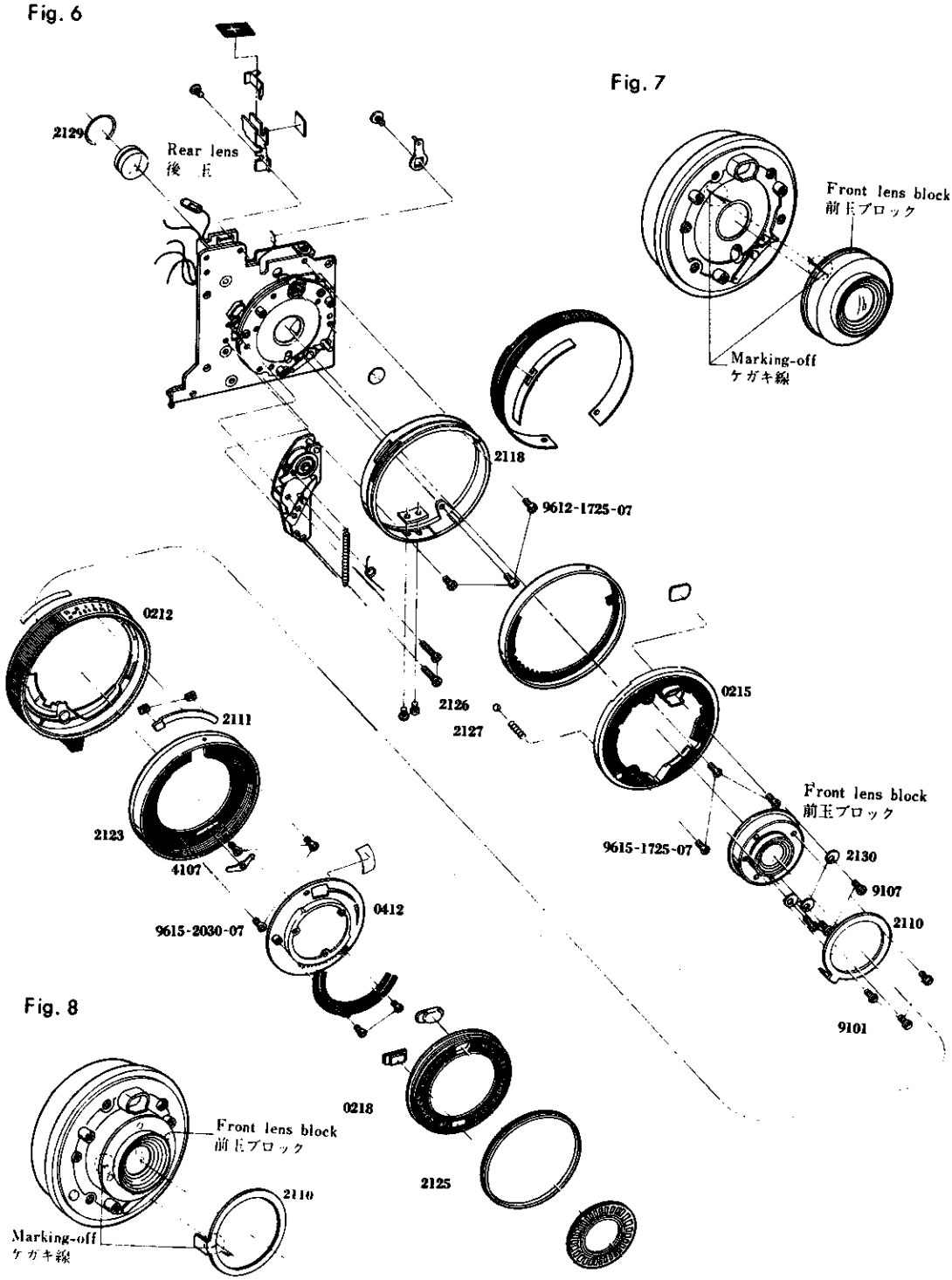


Fig. 7

Fig. 8

Fig. 9

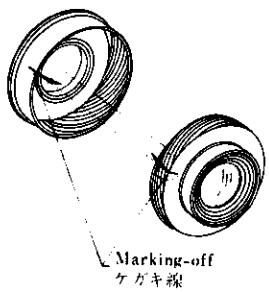
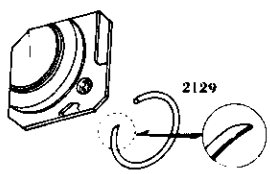


Fig. 10



J. Secter Part Removal

1. Remove three 9612-1733-01 and take off the front plate set.
2. 2614 and 2612 will now come off.
3. Remove two 9612-1467-01 and take off the self-gear block (168-200 and 168-600 only).
4. Unsolder the three cords (white, brown and orange). Fig. 12.
5. Remove four 9612-1733-01 and take off the outer frame set.
   Caution: Be sure to take 2621 off its set position before removing the outer frame set.
6. 2601 and 2621 will now come off.
7. Remove 9721-0120-50, 0710 and 2613 in that order.
8. Remove 9721-0120-50, 0714 and 2617 in that order
9. Remove two 9611-1720-01 and take off the light receiving block (0703).

K. Self-Gear Disassembly (168-200 and 168-600 only)

1. Remove 2701 and 2704.
2. Remove 9721-0120-50, 2703 and 2702 in that order.
3. Remove 9612-1420-01 and take off 0751.
4. 0754, 0753, 0756, 0755, 0757 and 0758 will now come off.

J. セクター部取外し要領

1. 9612-1733-01　3本を外し，前板セットを取外す。
2. 2614，2612が外れる。
3. 9612-1467-01　2本を外し，セルフギヤーブロックを取外す。(168-200，168-600のみ)
4. コード　3本（白，茶，橙）のハンダ付けを取外す。Fig. 12.
5. 9612-1733-01　4本を外し，外枠セットを取外す。
   注意事項：外枠セットを取外す前に2621を掛け位置より外しておくこと。
6. 2601，2621が外れる。
7. 9721-0120-50を外し，0710，2613を取外す。
8. 9721-0120-50を外し，0714，2617を取外す。
9. 9611-1720-01　2本を外し，受光部（0703）を取外す。

K. セルフギヤー分解要領 (168-200，168-600のみ)

1. 2701，2704を取外す。
2. 9721-0120-50を外し，2703，2702を取外す。
3. 9612-1420-01を外し，0751を取外す。
4. 0754，0753，0756，0755，0757，0758が外れる。

Fig. 11

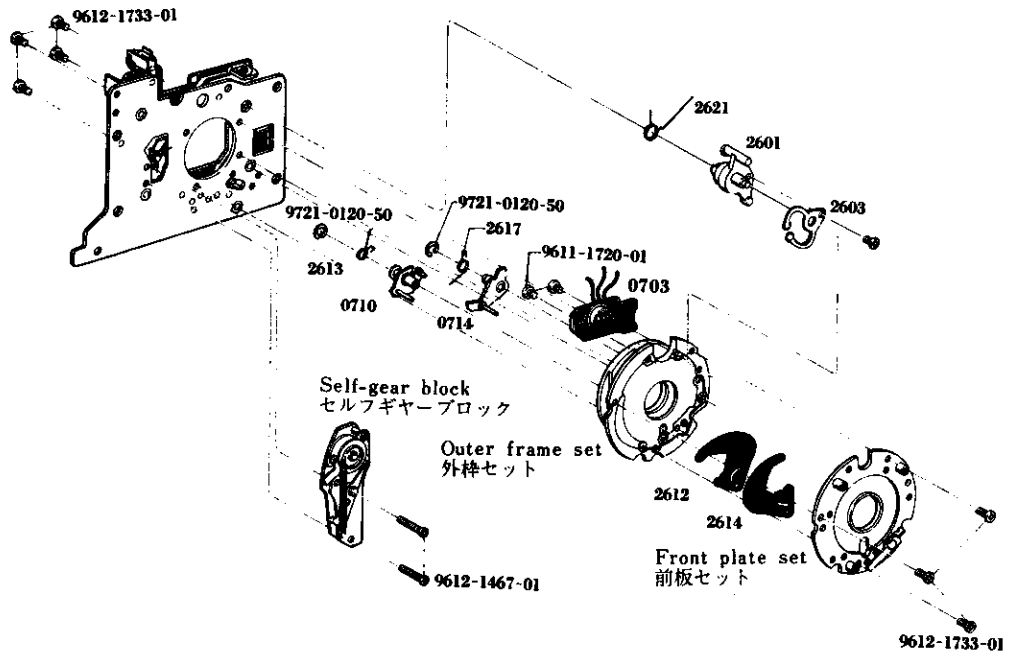


Fig. 12

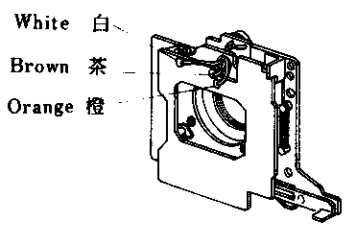


Fig. 13

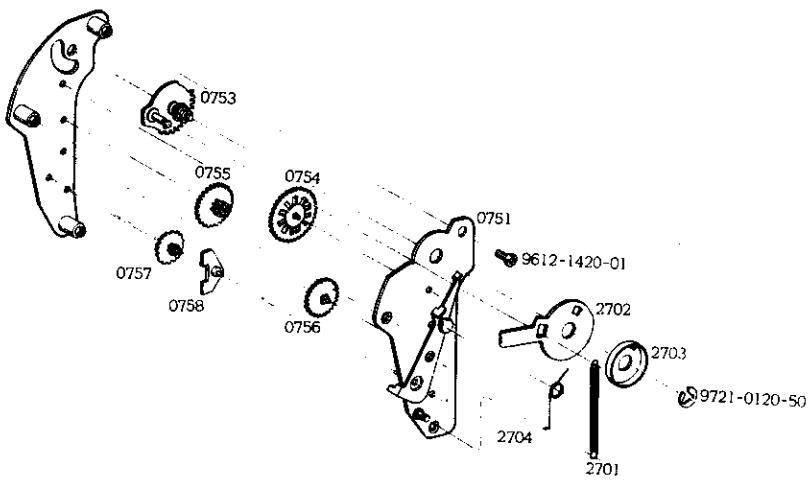


Fig. 14

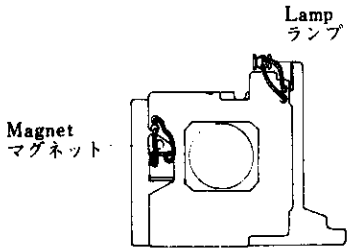


Fig. 15

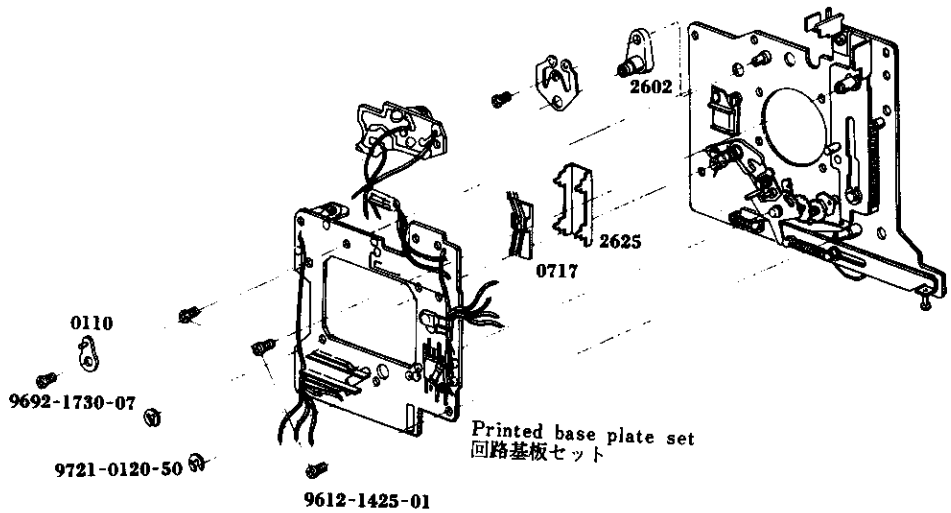
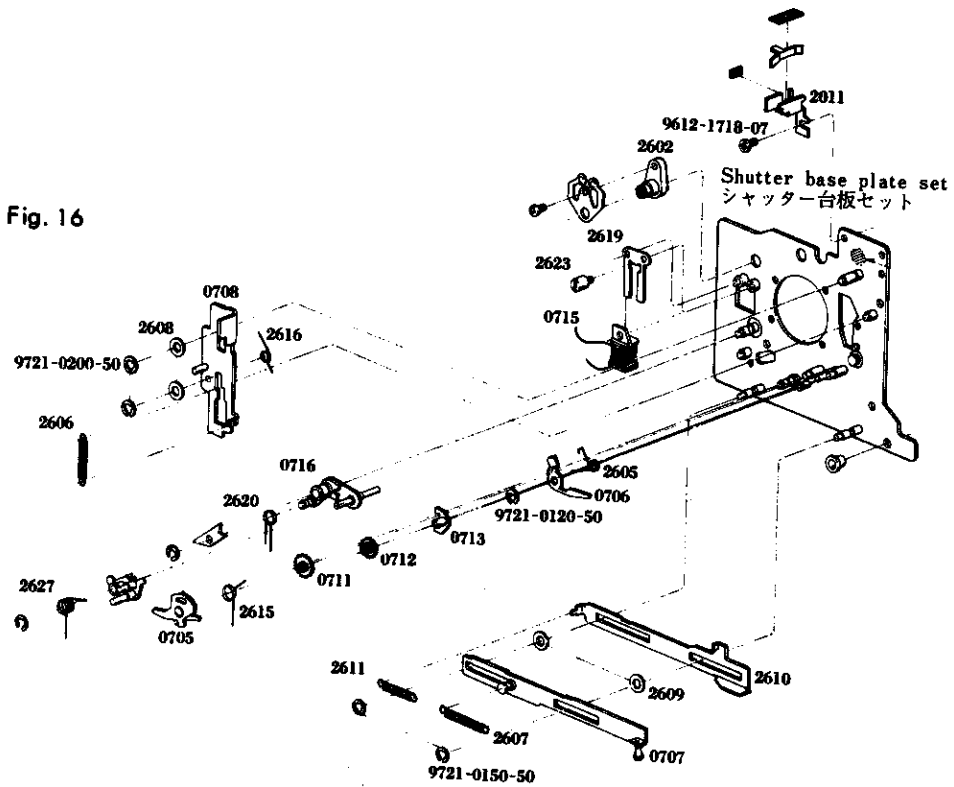


Fig. 16



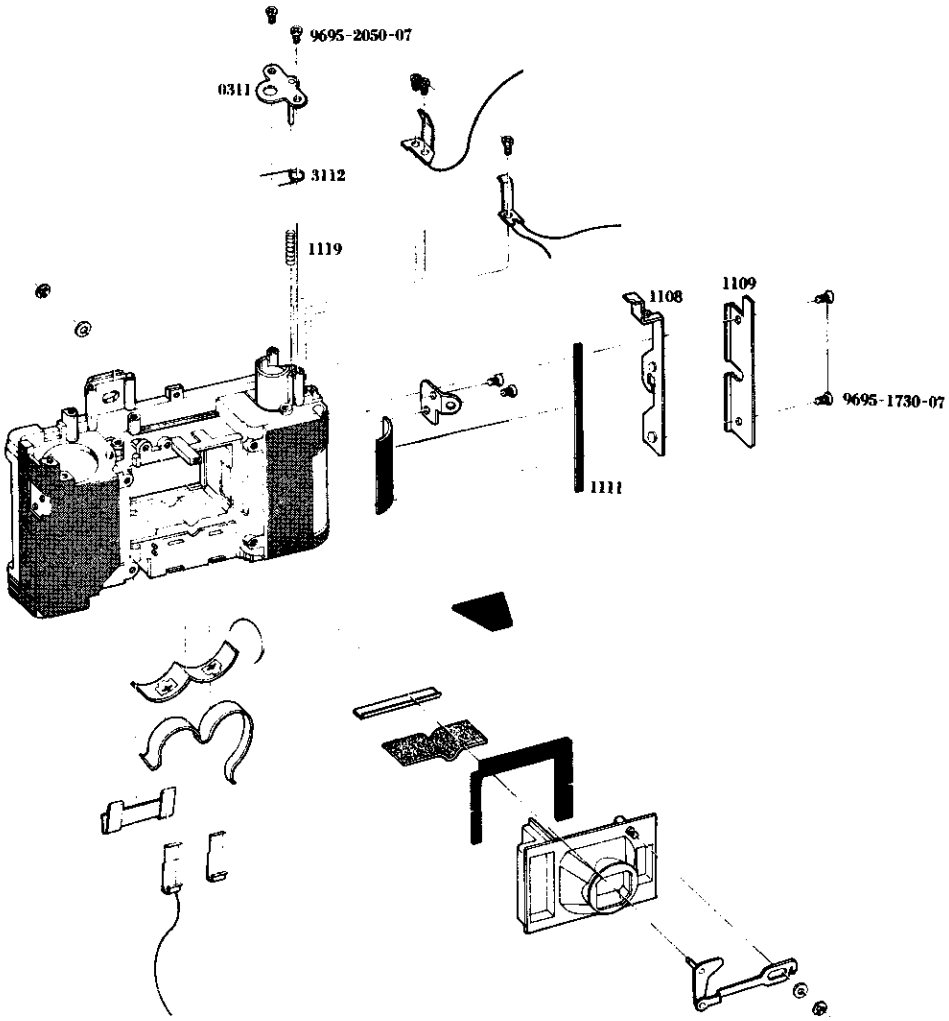
L. Shutter Base Plate Removal

1. Unsolder the lead wires of lamp and magnet. Fig. 14.
2. Remove 9692-1730-07 and take off 0110.
3. Remove three 9612-1425-01 and two 9721-0120-50 and take off the printed base plate set.
   Caution: Be sure to remove the printed base plate set after releasing the shutter (when 2610 is returned to its original position).
4. 2602, 0705, 2615, 2627, 0716, 2620, 0711, 0712 and 0713 will now come off.
5. Remove 9721-0120-50, 0706 and 2605 in that order.
6. Remove 9612-1718-07 and take off 2011.
7. Remove 2606 and two 9721-0200-50 and take off two 2608 and 0708.
8. Remove 2607 and 2611.
9. Remove two 9721-0150-50, 0707, two 2609 and 2610 in that order.
10. Remove 2613, and take off 2619 and 0715.
11. Remove 2625 and 0717 after raising the former's click.

L. シャッター台板取外し要領

1. ランプ，マグネットのリード線のハンダ付けを外す。Fig. 14.
2. 9692-1730-07を外し，0110を取外す。
3. 9612-1425-01　3本，9721-0120-50　2個を外し，回路基板セットを取外す。
   注意事項：回路基板セットはレリーズ後（2610が戻っている状態）で取外すこと。
4. 2602, 0705, 2615, 2627, 0716, 2620, 0711, 0712, 0713が外れる。
5. 9721-0120-50を外し，0706, 2605を取外す。
6. 9612-1718-07を外し，2011を取外す。
7. 2606, 9721-0200-50　2個を外し，2608　2個，0708を取外す。
8. 2607, 2611を取外す。
9. 9721-0150-50　2個を外し，0707, 2609　2個，2610を取外す。
10. 2613を外し，2619, 0715を取外す。
11. 2625の爪を起し，2625, 0717を取外す。

Fig. 17



M. Back Cover Lock System Removal

1. Remove two 9695-2050-07, and take off 0311, 3112 and 1119.
2. Remove 9695-1730-07, and take off 1109, 1108 and 1111.

M. 裏蓋ロック機構取外し要領

1. 9695-2050-07　2本を外し，0311，3112，1119を取外す。
2. 9695-1730-07　2本を外し，1109，1108，1111を取外す。

REASSEMBLY
組　立　編

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A. Shutter base plate ····· 1
B. Printed base plate ····· 3
C. Secter ····· 5
D. Self-Gear ····· 5
E. Front lens block and rear lens ····· 7
F. Lens barrel block ····· 9
G. Sprocket axis ····· 11
H. Winding axis, Upper base plate, and Lower base plate ····· 13
I. Counter ····· 15
J. Back cover lock system ····· 15
K. Shutter base plate block ····· 17
L. Back cover block ····· 17
M. Rangefinder and FM changing plate ····· 19
N. Counter block ····· 19
O. Top cover ····· 21
P. Bottom cover ····· 21

組　立　編

A. シャッター台板 ····· 1
B. 回路基板 ····· 3
C. セクター ····· 5
D. セルフギヤー ····· 5
E. 前玉ブロック及び後玉 ····· 7
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A. Shutter Base Plate Assembly

1. Place the groove of 2610 on the axis of the shutter base plate set, fix two 2609 and 0707 on it and fasten them with two 9721-0150-50.
2. Set 2607 and 2611. See Fig. 1.
3. Apply grease (No. 006) to the axis of the shutter base plate set and the point of 0708. See Fig. 2, 3.
4. Set 2616 as shown in Fig. 3 and place 0708 on the shutter base plate set.
5. Pass two 2608 through the above assembly and fasten them with two 9721-0120-50.
6. Set 2606. See Fig. 4.
7. Place 2605, fasten 0706 with 9721-0120-50 and set 2605. See Fig. 1.
   Post-Setting Check: Check that 2610 is stopped by 0706 when pushing 0707 in while it is smoothly released by depressing 0708.
8. Mount 2011 with 9612-1718-01. To adjust the mounting position, see the "HOW TO ADJUST" (P 8-11).
9. Fix 0716, 0712 and 0711 to the axis. See Fig. 6.
10. Apply grease (No. 006) as shown in Fig. 6.
11. Fix 0716 and set 2627 and 2620 to it. Fig. 8.
12. After setting 2615 to 0705 as shown in Fig. 7, fix them in the above assembly so that they become related to 0716 as shown in Fig. 8, and set 2615 to the latter. See Fig. 8.
13. Pass 0715 through 2619 and fasten it with 2623. For the mounting position, see the "HOW TO ADJUST" (P 8-10).
14. After assembling the shutter base plate, charge it by depressing 0707.
    Check that individual gears and levers operate smoothly on depression of 0708.

A. シャッター台板組込み要領

1. シャッター台板セットの軸に2610の溝部を通し，2609　2個，0707を置き，9721-0150-20　2個で固定する。
2. 2607，2611を掛ける。Fig. 1.
3. シャッター台板セットの軸及び0708の爪部にグリース（No.006）を塗る。Fig. 2，3.
4. 2616をFig. 3のように掛け，0708をシャッター台板セットに置く。
5. 2608　2個を通し，9721-0120-50　2個で止める。
6. 2606を掛ける。Fig. 4.
7. 2605を置き，0706を9721-0120-50で止め，2605を掛ける。Fig. 1.
   取付後の確認：0707を押し込むことにより，2610が0706に係止され，0708を押し下げるとスムースに解除されることを確認する。
8. 2011を9612-1718-01で取付ける。取付位置の調整は調整編（P 8-11）を参照。
9. 0713，0712，0711を軸にはめる。Fig. 6.
10. Fig. 6のようにグリース（No.006）を塗る。
11. 0716をはめ込み，2627，2620を掛ける。Fig. 8.
12. 0705に2615をFig. 7のように掛けてから0716との関係がFig. 8のようになるようにはめ込み，2615を掛ける。Fig. 8.
13. 2619に0715を通し，2623で固定する。取付位置は調整編（P 8-10）参照。
14. シャッター台板組込み終了後，0707を押してチャージし，0708を押すとスムースに各ギヤー，レバーが作動することを確認する。

Fig. 1

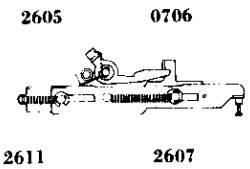


Fig. 2

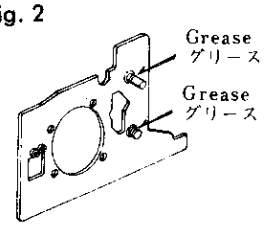


Fig. 3

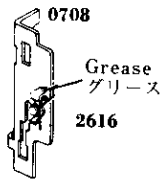


Fig. 4

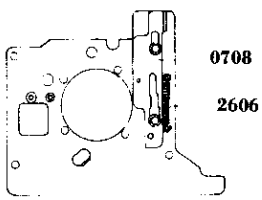


Fig. 5

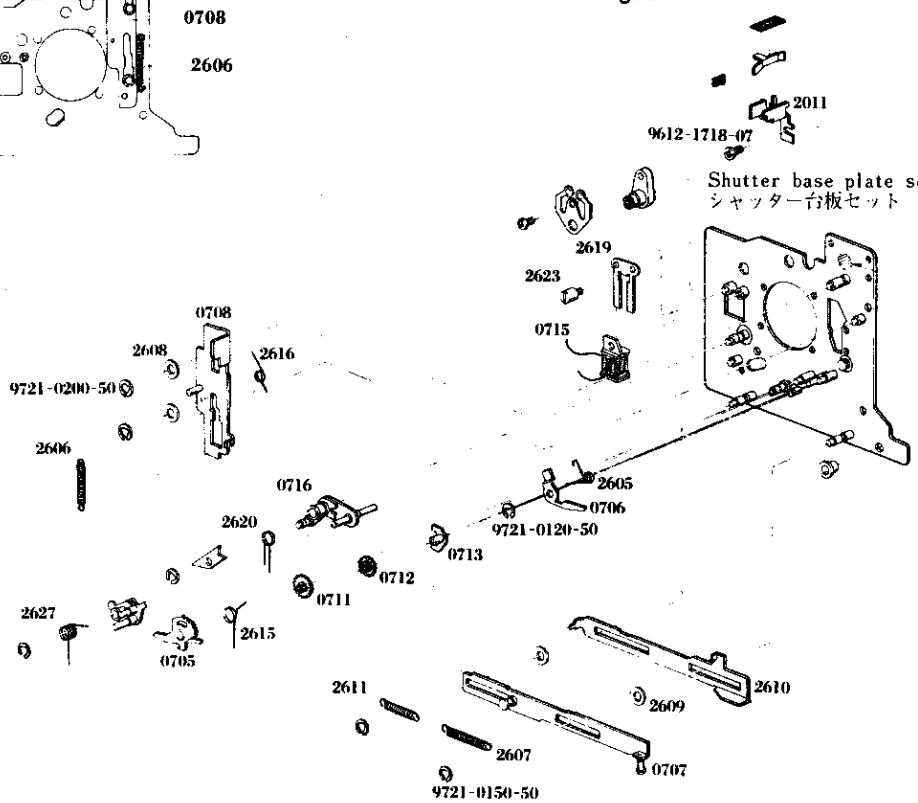


Fig. 6

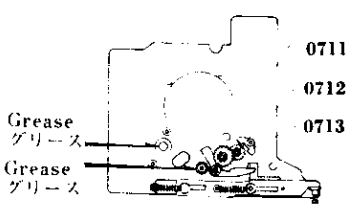


Fig. 7

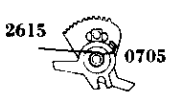
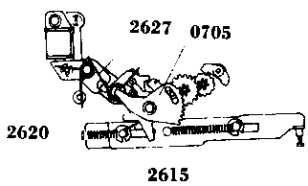


Fig. 8



(Position of the after charge)
(チャージ後の状態)

B. Printed Base Plate Assembly

1. Place 0717 on the printed base plate set, pass 2615 through it and fasten it by bending its end. Be sure that 0717 is correctly placed with its top and bottom. See Fig. 9. To adjust $SW._1$ and $SW._2$, see the "HOW TO ADJUST" (P 7-9).
2. Fix 2602 in the shutter base plate set. Mount the printed base plate set on the shutter base plate block while checking that 0713 shown in Fig. 6 is neither above nor below 0712. At the same time, check that the pin of 0716 is between $SW._3$ and $SW._6$ as shown in Fig. 10 and also that the pin of 0708 fits into the hole of 0717. Fig. 12.
   Caution: Mount the printed base plate set after the shutter is released (when 2610 is returned to its original position).
3. Fasten the printed base plate set with three 9612-1425-01 and two 9721-0120-50.
   Post-Setting Check: Check that 0717 slides vertically while depressing 0708.
4. Mount 0110 with 9692-1730-07.
5. Solder the lead wires of magnet and lamp. See Fig. 13.
   Caution: No available lamp for 195 (195-2701).
6. For the adjustment of $SW._3$ and $SW._6$, see the "HOW TO ADJUST" (P 7-9).

B. 回路基板組込み要領

1. 回路基板セットに0717を置き，2615を通し，先端を曲げて固定する。
   上下を間違わないこと。Fig. 9.
   $SW._1$，$SW._2$の調整は調整編（7-9）参照。
2. シャッター台板ブロックに2602をはめ込み，Fig. 6の0713が0712の上，或いは下になっていないこと、又、Fig. 10のように0716のピンが$SW._3$，$SW._6$の間にくること、及びFig. 12のように0708のピンが0717の穴に入ることを確認しながら回路基板セットを取付ける。
   注意事項：回路基板セットを取付ける時はレリーズ後の状態（2610が戻っている状態）で行うこと。
3. 9612-1425-01　3本，9721-0120-50　2個で固定する。
   取付後の確認：0708を押し下げることにより，0717もそれにつれて上下にスライドすることを確認する。
4. 0110を9692-1730-07で取付ける。
5. マグネット，ランプのリード線をハンダ付けする。Fig. 13.
6. $SW._3$，$SW._6$の調整は調整編（P 7-9）参照。

Fig. 9

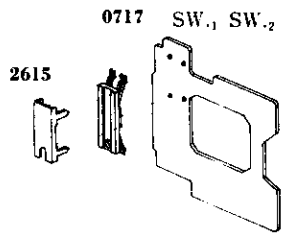


Fig. 10

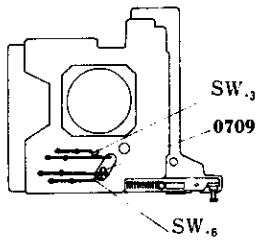


Fig. 11

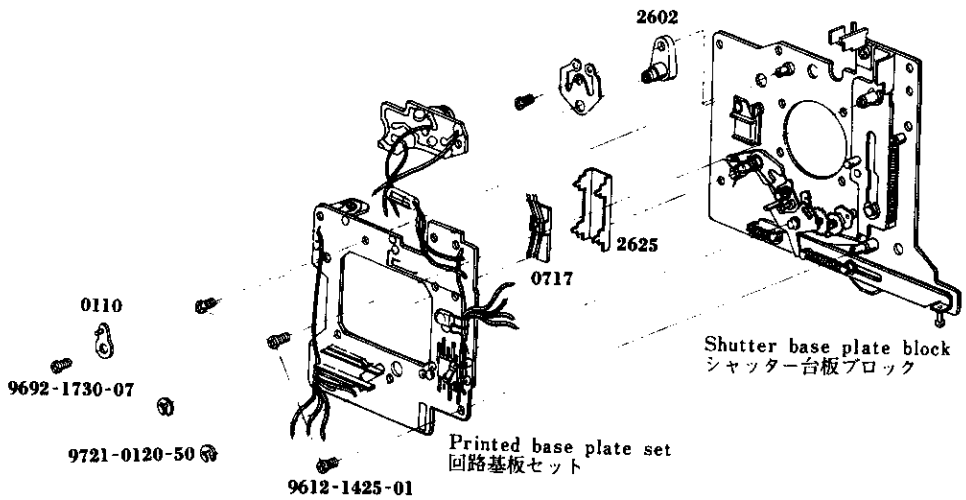


Fig. 12

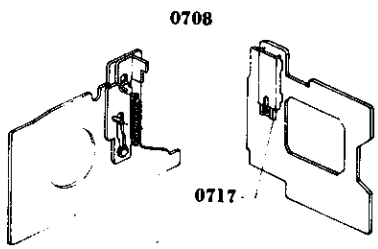
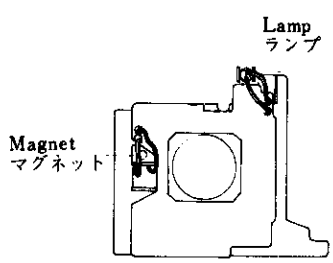


Fig. 13



C. Secter Part Assembly

1. Fix 0714 and 0710 into the outer frame set and fasten them with 9721-0120-50 respectively.
2. Set 2617 and 2613 to the above assembly. See Fig. 15.
3. Mount 0703 (light receiving block) with two 9611-1720-01.
4. Pass 2621 through 2601 and insert it into the shutter base plate set. See Fig. 16.
5. Assemble the outer frame set into the shutter base plate, fasten it with four 9612-1733-01 and set 2621 to it as shown in Fig. 17.
6. Pass three lead wires (white, brown and orange) through the holes provided on the shutter base plate set, and solder them. Fig. 18.
7. After cleaning 2612 and 2614, place them on the outer frame set.
   Caution: Be cautious with 2612 and 2614 which are identical in shape. Distinguish them by their grooves which differ in shape. Be sure that 2612 and 2614 are assembled in that order.
8. Mount the front plate set with three 9612-1733-01.
9. Mount the self-gear block with two 9612-1467-01 (168-200 and 168-600 only).

D. Self-Gear Assembly (168-200 and 168-600 only)

1. Place 0753, 0755, 0754, 0757, 0758 and 0756 on 0752 in that order after applying grease (No. 006) to them. Fig. 21.
2. After checking that individual gear axis are fitted in their holes, place 0751 on the above assembly and fasten it with 9612-1420-01.
3. Set 2704 to the above assembly. Fig. 22.
4. Place 2702 on the above assembly. Be sure that 2702 is correctly placed with its surface and reverse. Fig. 22.
5. Insert the projection of 2703 in the square hole of 2702 and fasten it with 9721-0120-50.
6. Set 2701 to the above assembly. Fig. 22.

C. セクター部組込み要領

1. 0714, 0710を外枠セットにはめ込み，それぞれ9721-0120-50で止める。
2. 2617, 2613を掛ける。Fig. 15.
3. 0703（受光部）を9611-1720-01　2個で取付ける。
4. 2621を2601に通し，シャッター台板セットに差し込む。Fig. 16.
5. 外枠セットをシャッター台板に組込み，9612-1733-01　4本で締め付け，2621をFig. 17のように掛ける。
6. リード線3本（白，茶，橙）をシャッター台板セットの穴に通し，ハンダ付けする。Fig. 18.
7. 2612, 2614を清掃して外枠セットに置く。
   注意事項：2612, 2614の外形は全く同じであるので注意すること。溝の形状が異なるので判別できる。
   Fig. 19. 組込み順序を間違えないこと。2612, 2614の順。
8. 前板セットを9612-1733-01　3本で取付ける。
9. セルフギヤーブロックを9612-1467-01　2本で取付ける。（168-200, 168-600のみ）

D. セルフギヤー組込み要領（168-200, 168-600のみ）

1. Fig. 21のようにグリース（No.006）を塗り，0752に0753, 0755, 0754, 0757, 0758, 0756の順に置いてゆく。
2. 各ギヤーの軸が軸穴より外れていないことを確認して0751を置き，9612-1420-01で取付ける。
3. 2704を掛ける。Fig. 22.
4. 2702を置く。この時裏表を間違えないこと。Fig. 22.
5. 2703の突起部を2702の角穴にはめ，9721-0120-50で止める。
6. 2701を掛ける。Fig. 22.

Fig. 14

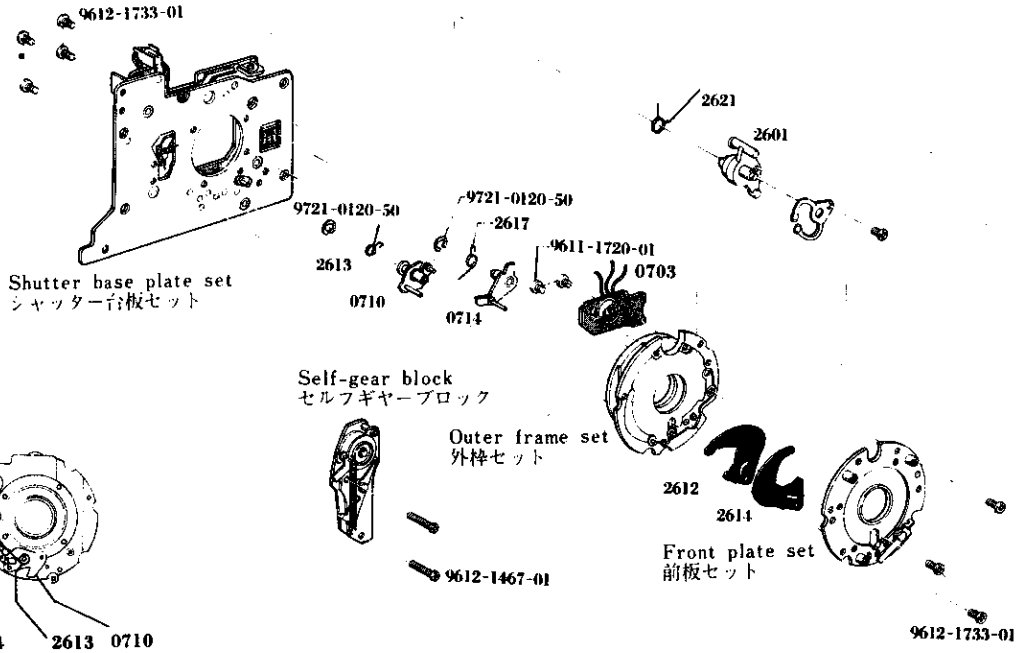


Fig. 15

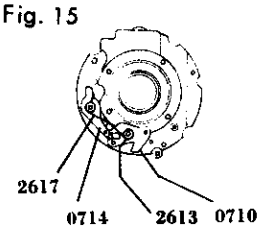


Fig. 16

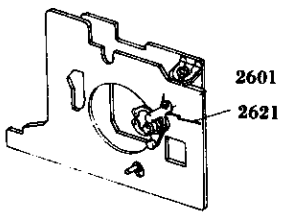


Fig. 17

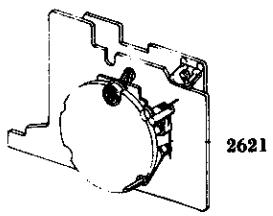


Fig. 18

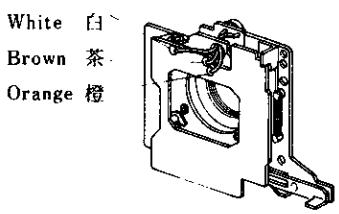


Fig. 20

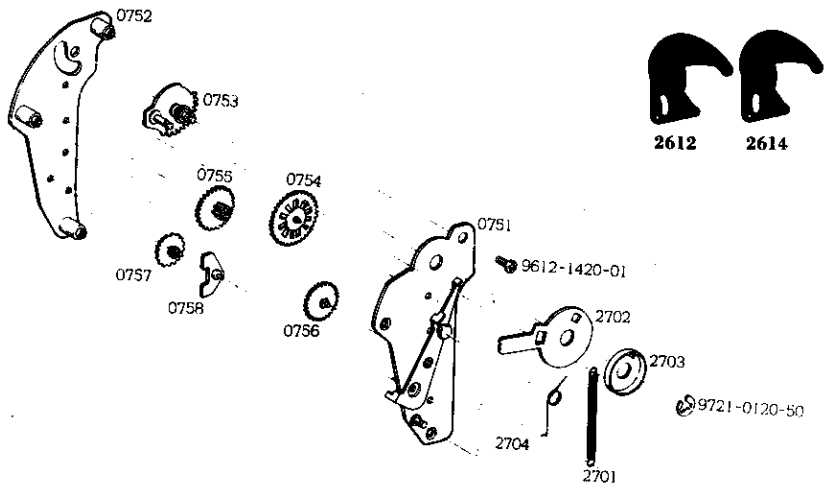
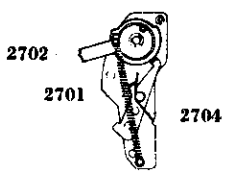


Fig. 19

Fig. 21

Fig. 22



E. Front Lens Block and Rear Lens

1. Apply grease (No. 006) to the helicoid, and assemble it into the position (Fig. 24) noted during disassembly.
2. Place the front lens block in the position (Fig. 25) noted during disassembly, and fasten it with three 9107 and three 2130. Take care that the screws are uniformly fastened.
3. Place 2110 in the position (Fig. 26) noted during disassembly, and fasten it with three 9101.
4. Insert rear lens block to shutter base, then Insert 2129 to shutter base groove by special tool as illustrated in the Fig. 27, 28.
5. For focus adjustment, see the "HOW TO ADJUST" (P 11-16).

E. 前玉ブロック，後玉組込み要領

1. ヘリコイドにグリース（No.006）を塗り，分解時に確認しておいた位置より組込む（Fig. 24)。
2. 前玉ブロックを取外し時に確認しておいた位置（Fig. 25）に9107　3本，2130　3個で固定する。ビスを締める時は均等に締めるように注意する。
3. 2110を取外し時に確認しておいた位置（Fig. 26）に9101　3本で取付ける。
4. 後玉をはめ込み，2129を専用治工具（Code No. 168-2129-77) を使用して，シャッター溝に挿入する。Fig. 27, 28参照。
5. ピント調整は調整編（P 11-16）参照。

Fig. 23

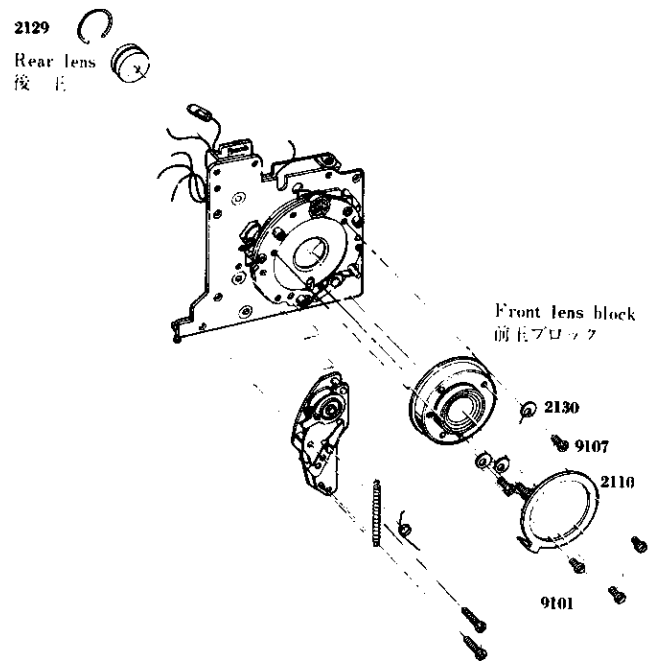


Fig. 24

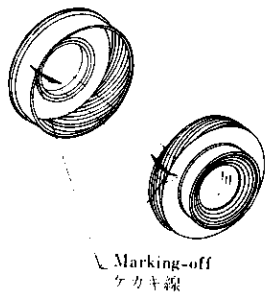


Fig. 25

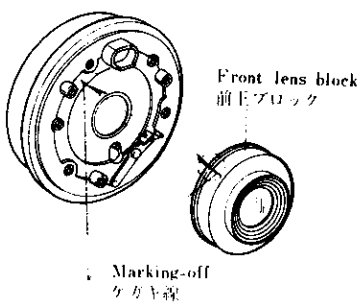


Fig. 26

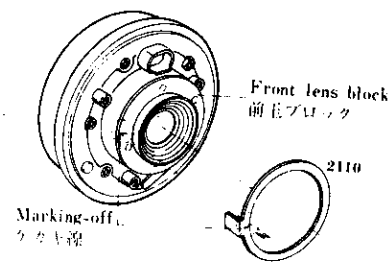


Fig. 27

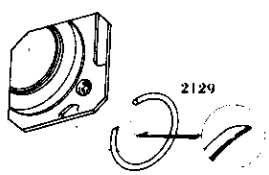
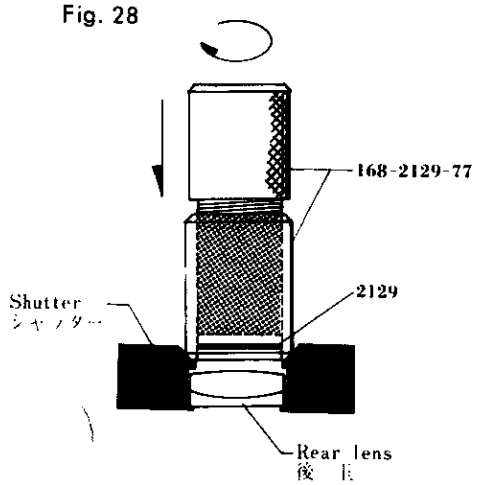


Fig. 28



F. Lens Barrel Assembly

1. Set the self-lever (168-200 and 168-600 only), assemble 2118 into it, and fasten them with three 9612-1725-07.
2. Place 2127 and 2126 on 0215, and set them to the 2491 block with three 9615-1725-07 while pressing them down with 2113. Apply grease (No. 006) to the click ball claw section of 2113, as shown in Fig. 30.
   Caution: After fastening the screws, be sure 2113 and the click stop are operating normally.
3. Apply grease (No. 006) to 0212, as shown in Fig. 31, and insert it into the hook of 2110 (Fig. 32-A). Insert 0212 so that the FM distance cam may become as shown in Fig. 32-B.
4. Apply grease (No. 006) to 2111, and insert it into 0212. (Fig. 33).
5. Fasten 2123 to the above assembly with three 9615-2030-07.
6. Apply grease (No. 006) to 4107, and place it on 2123.
7. By placing 0412, insert 0218 into 2123 so that the former's pin can fit in the latter's slot, and fasten it with 2125. Check that 0412 and the click operate correctly.

F. 鏡胴組込み要領

1. セルフレバーをセットして（168-200, 168-600のみ), 2118を組込み, 9612-1725-07　3本で固定する。
2. 0215に2127, 2126を置き, 2113で押えながら, 9615-1725-07　3本で2491ブロックに取付ける。尚, 2113のクリックボール噛み合い部にはFig. 30のようにグリース（No. 006）を塗っておく。
   注意事項：ビス締付け後には2113の作動, クリックストップを確認しておく。
3. 0212にグリース（No. 006）をFig. 31のように塗り, 2110の引掛部（Fig. 32-A）に合わせて組込む。0212取付け時, FM距離カムがFig. 32-Bの状態になるように組込むこと。
4. 2111にグリース（No. 006）を塗り, 0212にはめ込む（Fig. 33)。
5. 2123を9615-2030-07　3本で取付ける。
6. 4107にグリース（No. 006）を塗り, 2123の上に置く。
7. 0412を置いて, 0218のピンが2123の穴にはまるように0218をはめ込み, 2125で締付ける。0412の作動, 及びクリックを確認する。

Fig. 29

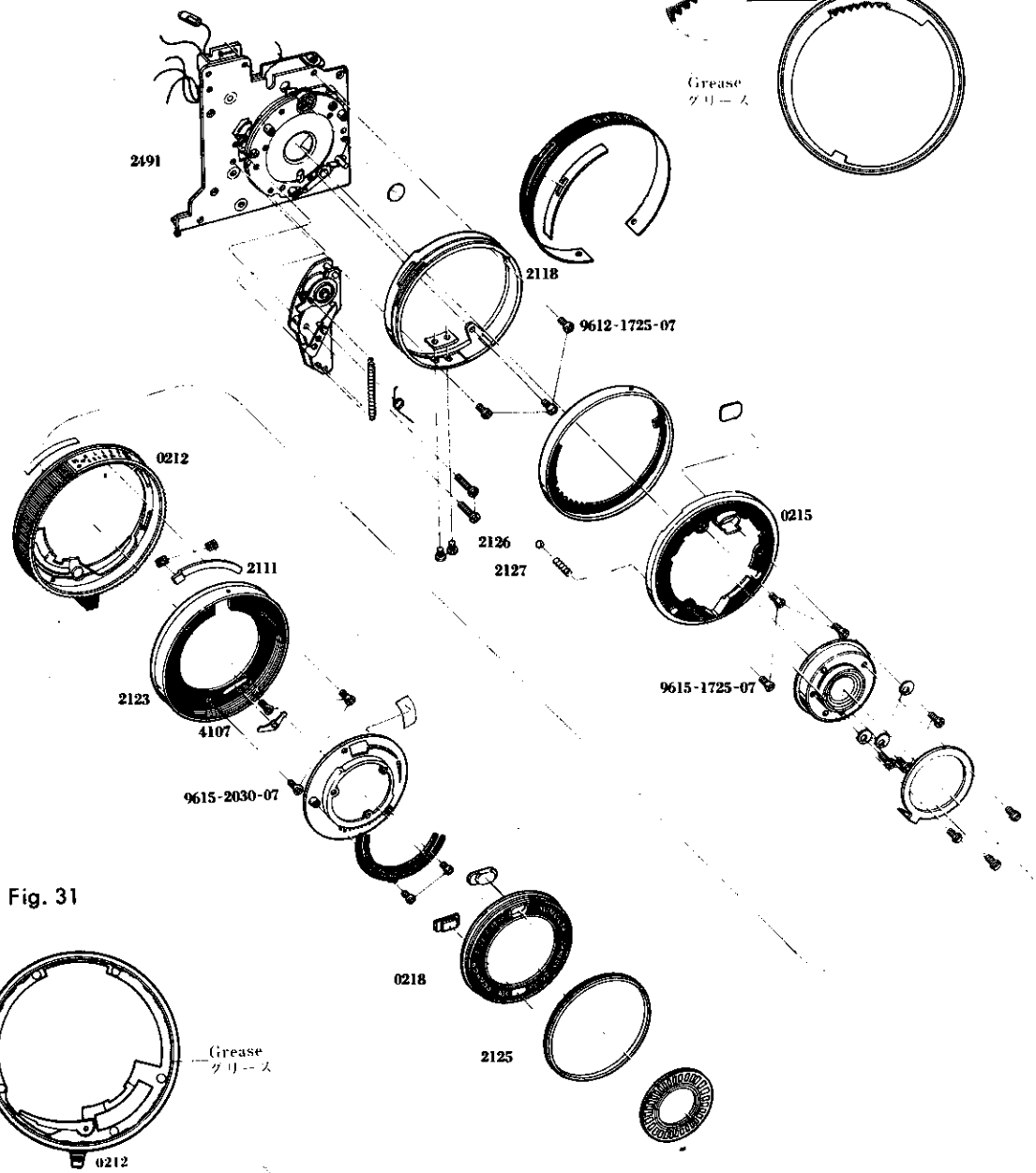


Fig. 30

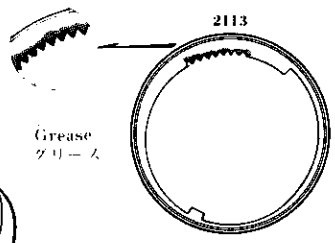


Fig. 31

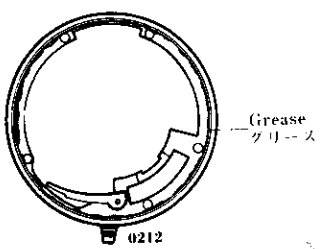


Fig. 32

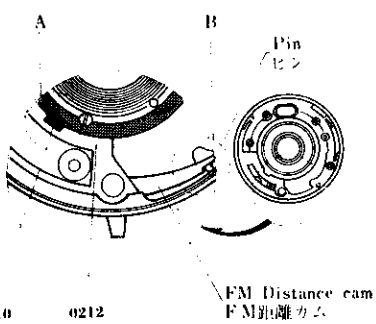
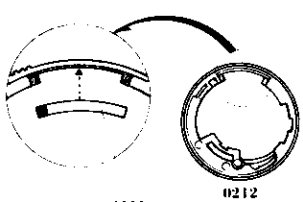


Fig. 33



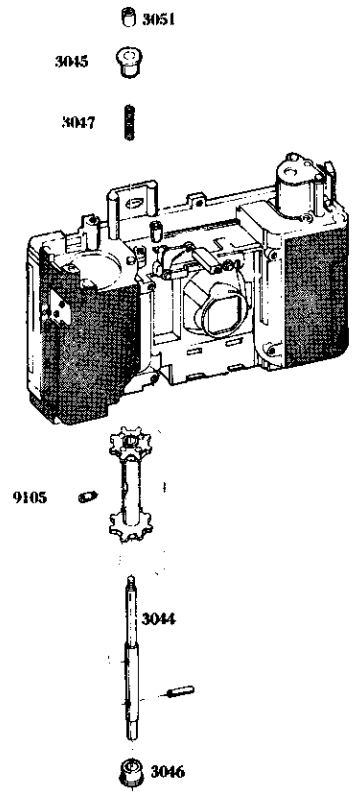
G. Sprocket Axis Assembly

1. Apply grease (No. 006) to the axis holes of 3045 and 3046.
2. Place 3047 in 3044, and insert them into the body.
3. Make the oval hole of the sprocket coincide with the screw hole of 3044, and fasten 9105.
4. Fasten 3051 to the upper section of 3044, and screw-lock it.

G. スプロケット軸組込み要領

1. 3045, 3046の軸穴にグリース (No.006) を塗る。
2. 3044に3047をはめ込み，ボデーに挿入する。
3. スプロケットの小判穴に3044のビス穴を合わせて，9105を締める。
4. 3051を3044の上部に締付け，ネジロックをする。

Fig. 34



H. Winding Axis, Upper and Lower Base Plates Assembly

1. Insert the spool gear block into 0308, and attach it to the body.
   Caution: When fixing the spool to the body, check that 3250 is deep behind the spool.
2. Insert 4045 into the body. Be sure top and bottom sections are correctly inserted. (Fig. 35).
3. Assemble the upper base plate block into the body. Apply grease (No. 006) beforehand to the holes of 3007.
   Caution: When assembling, insert 0404 between 4043 and 4044. Fix 3055 as shown in Fig. 36.
4. Fasten the upper base plate with 3058 and two 9692-2050-07. Insert 3059 through the upper base plate before fastening 3058.
5. Secure the lower base plate block with 9695-2050-01 and two 9692-2050-07.
6. Assemble 3007 into the upper base plate block.
   Caution: To assemble them, hook the end of 3012 on to the stopper of 3007, and give it a full turn in the direction of the arrow. (Fig. 38) Be sure 3012 is not imprisoned in the axis holes. When inserting 3025 into 0304, be sure the convex section of 3025 faces the gear section of 0403. (Fig. 39).
7. Apply grease (No. 006) to the hole of 3062, and insert it into 3007.
8. Insert 0307 into 3007 so that it is positioned as shown in Fig. 40. Be sure the claw of 0307 does not mount on 3062.
9. Place 3078 on the above assembly, and fasten it with 3069 (left screw).
10. See Fig. 41 to show how to set springs for the bottom base plate block.
11. Set 3241 with 3251, and hook 3243 on to it, as shown in Fig. 42.

H. 巻取軸，上部台板，下部台板組込み要領

1. 0308にスプールギヤーブロックをはめ込み，ボデーにセットする。
   注意事項：スプールをはめ込む時，3250がスプールの奥側にあることを確認する。
2. 4045をボデーにはめ込む。上下を間違わないこと（Fig. 35)。
3. 上部台板ブロックを組込む。巻取軸穴にはグリース（No.006）を塗っておく。
   注意事項：組込む際，0404が4043と4044の間にはまるようにすること。Fig. 36のように3055を掛ける。
4. 3058，9692-2050-07　2本で上部台板ブロックを締付ける。
   3058を締付ける前に3059を下部に通しておく。
5. 9695-2050-01，9692-2050-07　2本で下部台板ブロックを取付ける。
6. 3007を，上部台板ブロックに組込む。
   注意事項：3012の端を巻取ストッパーに掛けてから一回転矢印方向（Fig. 38）にチャージして組込む。
   3012が軸穴に喰い込まないように注意する。
   3025を0304にはめ込む際，3025の偏心凸部が0304のギヤー部に向くようにすること（Fig. 39)。
7. 3062の穴にグリース（No.006）を塗り，3007にはめ込む。
8. 0307をFig. 40の位置になるように，3007にはめる。
   その際，0307の爪が3062に乗り上げないように注意する。
9. 3078を置き，3069（左ネジ）で止める。
10. 下部台板ブロック関係のスプリングの掛け方はFig. 41参照。
11. 3241を3251で取付け，3243をFig. 42のように掛ける。

Fig. 35

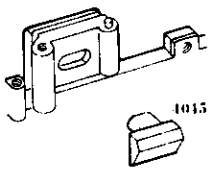


Fig. 36

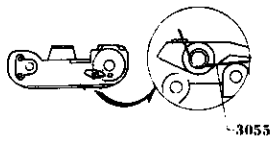


Fig. 38

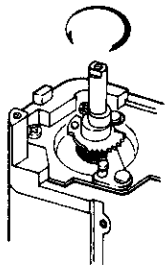


Fig. 37

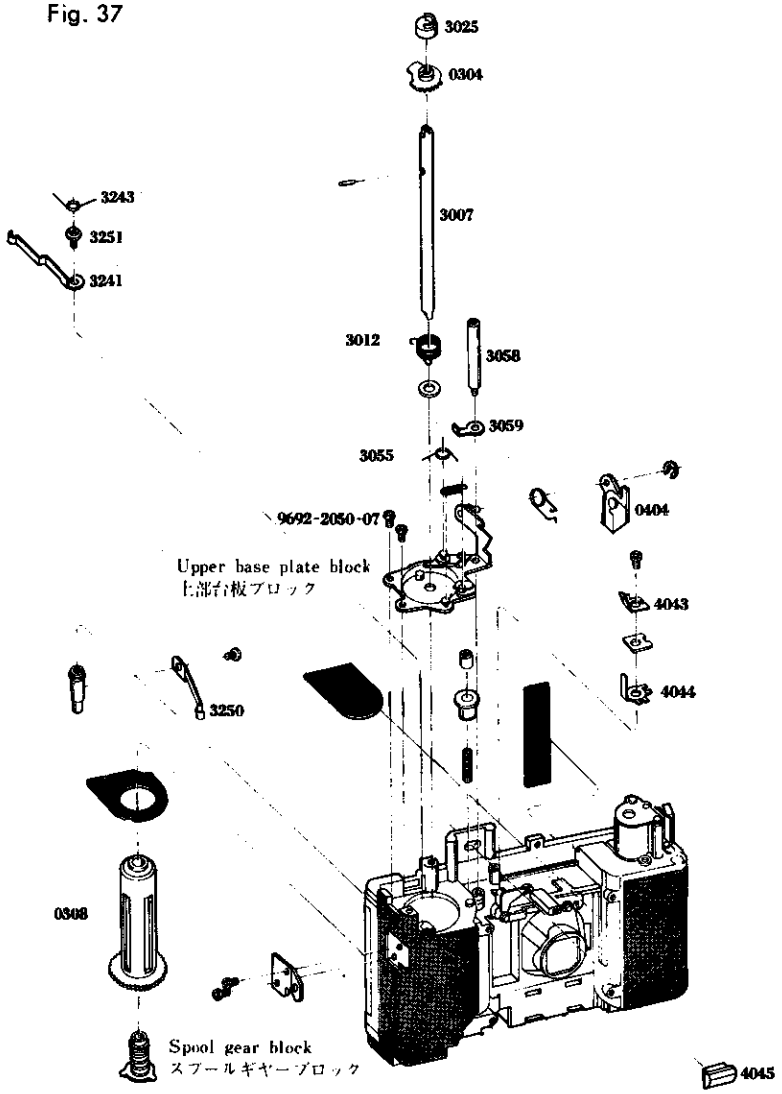


Fig. 39

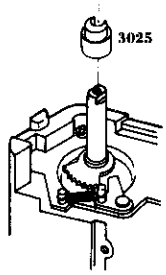


Fig. 40

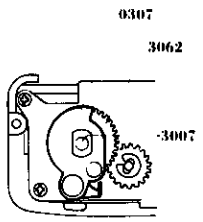


Fig. 41

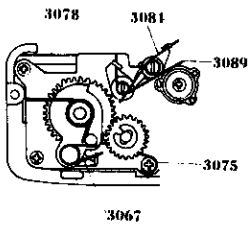
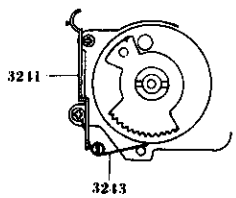
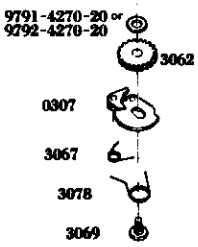
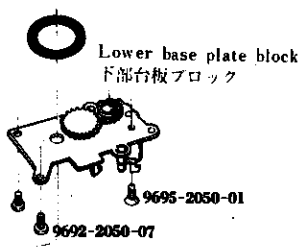


Fig. 42







I. Counter Assembly

1. Insert 0323 into 0325, and hook 3223 on to it Fig. 43.
2. Insert 9721-0150-07 into the groove to check that 0323 operates correctly.
3. Set 3219 as indicated in Fig. 45.
4. Insert 0324 into 0325, and fix the spring to it, as shown in Fig. 46. Insert 0324 by lifting and turning it until its convex section goes over the bent section of 0325.
5. Insert 3208 into the above assembly, checking that 0324 operates correctly.
6. Set 3207 to "0" of the counter, and fix it with two 9612-1420-07.
7. See Fig. 47 to show how to set the springs to the bottom of the counter block.

J. Back Cover Lock System Assembly

1. Place 1108 and 1111 on the body, hold them with 1109, and fasten them with two 9695-1730-07.
2. Set 3112 as shown in Fig. 49.
3. Put 1119 through the pin of 0311, insert it into the hole of 1108, and fasten it with two 9695-2050-07.

I. カウンターブロック組立要領

1. 0323を0325にはめ込み，3223を掛ける（Fig. 43)。
2. 9721-0150-07を溝にはめ込み0323の作動を確認する。
3. 3219をFig. 45のように掛ける。
4. 0324を0325にはめ込み，スプリングをFig. 46，のように掛け0324を浮かしながらギヤーの凸部が0325の折り曲げ部を越えるまで回転させて押し込む。
5. 3208をはめ込み，0324の作動を確認する。
6. 3207をカウンター“0”位置に合わせて，9612-1420-07　2本で取付ける。
7. カウンターブロック下部のスプリングの掛け方はFig. 47参照。

J. 裏ブタロック機構組込み要領

1. ボデーに1108，1111を置き，1109で押え，9695-1730-07　2本で取付ける。
2. 3112をFig. 49のように掛ける。
3. 1119を0311のピンに通し，1108の穴にはめ込み，9695-2050-07　2本で取付ける。

Fig. 43

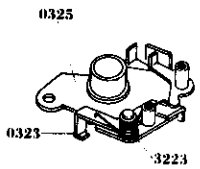


Fig. 44

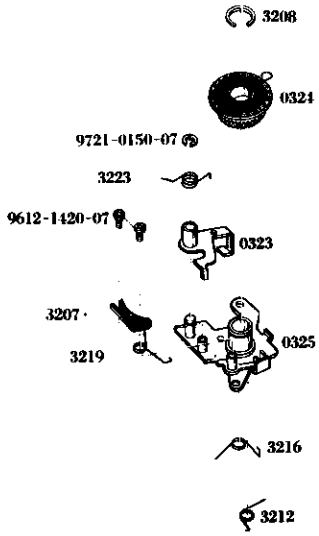


Fig. 45

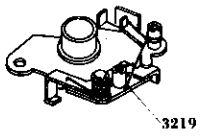


Fig. 46

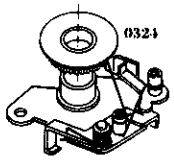


Fig. 47

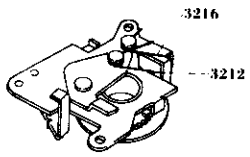


Fig. 49

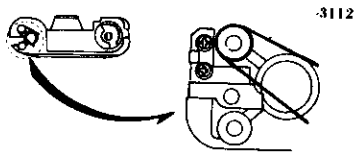
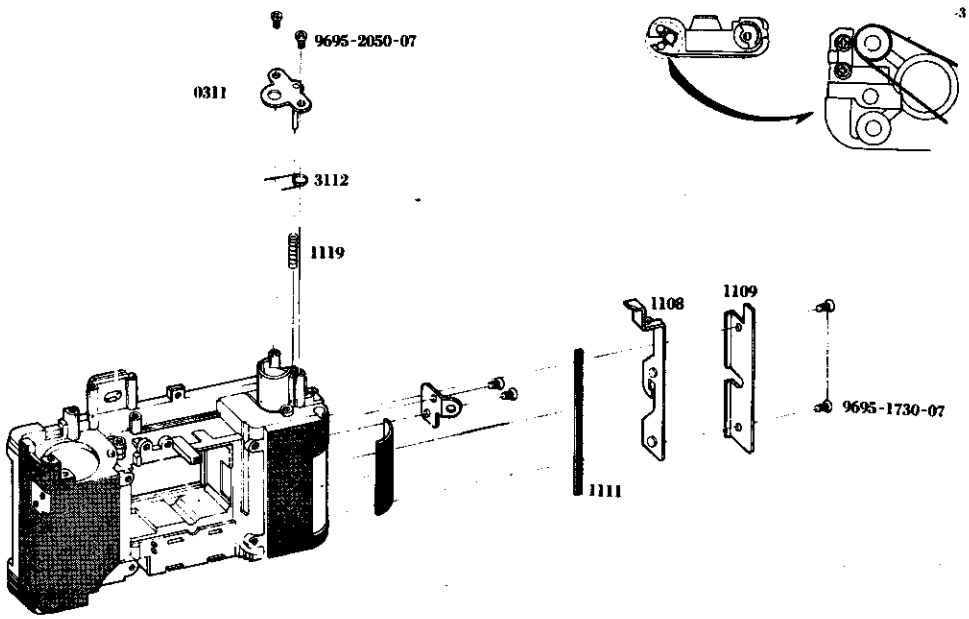


Fig. 48



K. Shutter Base Plate Block Assembly

1. Plug 2128 into the body. Apply grease (No. 006) beforehand to the hole in the body. For the direction of 2128 to be inserted, see Fig.51.
2. Fix the shutter base plate block to the body.
   Caution: Assemble the shutter base plate block into the body so that the pin of 0110 (Fig. 53) on the block fits in the groove of 0106 (Fig. 52).
3. Fasten the shutter base plate block with four 9695-2055-07 after checking that it was correctly placed with no play.
4. Solder the cord to the position indicated in Fig. 2, 3 of the "Disassembly".

L. Back Cover Assembly

1. Fix the back cover block to the body, and fasten it with three 9695-2040-07. After fixing, check that the back cover opens or closes smoothly.

K. シャッター台板ブロック組込要領

1. 2128をボデーにさし込む。その際グリース (No.006) をボデー穴に塗っておく。
   方向はFig.51参照。
2. シャッター台板ブロックをボデーに取付ける。
   注意事項：ボデーに取付ける際，0106の溝部 (Fig. 52) にプリント基板側のピン0110 (Fig. 53) が入るように組み込む。
3. 浮き，ガタのないのを確認して，9695-2055-07　4本で締付ける。
4. 分解編Fig. 2，3の位置にコードをハンダ付けする。

L. 裏ブタブロック組込み要領

1. ボデーに裏ブタブロックを合わせ，9695-2040-07　3本で締付ける。
   取付け後，開閉作動を確認する。

Fig. 51

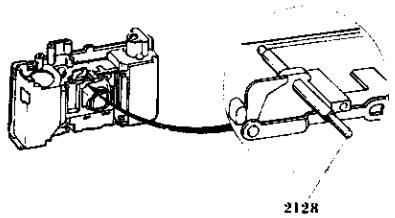


Fig. 50

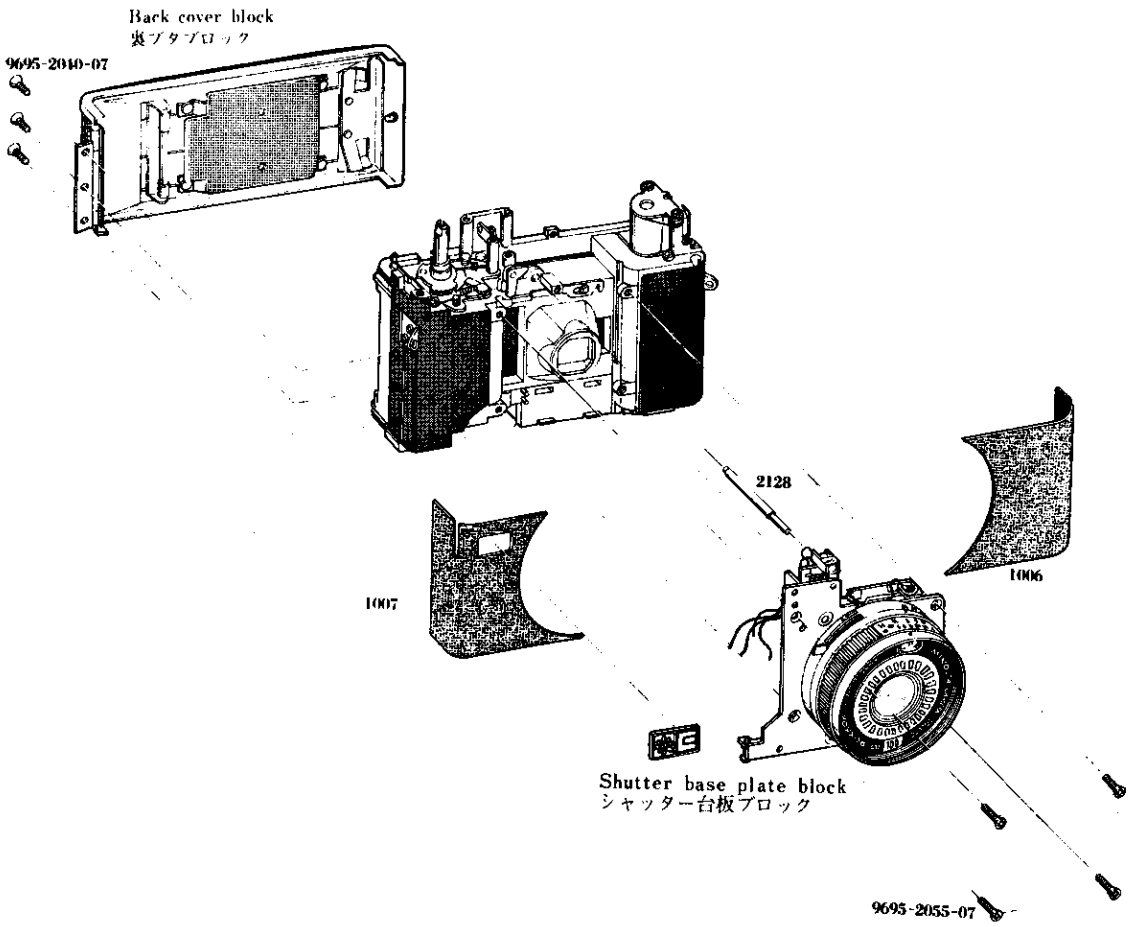


Fig. 52

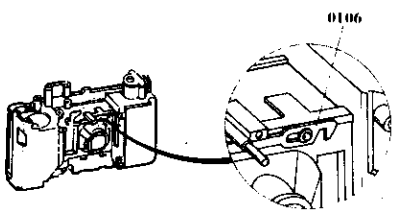
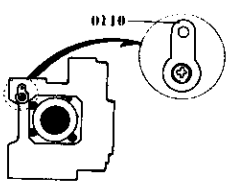


Fig. 53



M. Rangefinder Block and FM Changing Plate Assembly

1. Push in 2128 toward the lens barrel.
2. Apply grease (No. 006) to the rangefinder lever (the section in contact with 2128), and assemble the rangefinder block by holding its lever down so that it fits in the rear of 2128.
3. Fasten the rangefinder block with three 9692-2080-07.
4. Apply grease (No. 006) to 0114 as shown in Fig. 55, fix it to the body, and fasten it with 9695-2040-07 and 9615-2030-07.
   Cantion: After assembly, check that 0114 interlocks with the printed base plate block on depressing the lever of 0114.
5. See Fig. 32 for setting the spring to 0114.
6. For the rangefinder adjustment, see the "HOW TO ADJUST" (P 4 - 5).

N. Counter Block Assembly

1. Put the counter block throngh the winding axis, and fasten it with two 9692-2050-07.
2. For the counter adjustment, see the "HOW TO ADJUST" (P 3 - 4).

M. 距離計ブロック，FM切換板組込み要領

1. 2128を鏡胴側に押し込む。
2. 距離計のレバー（2128に当る部分）にグリース（No.006）を塗り，2128の後側に距離計のレバーが入るようにレバーを押えながら距離計ブロックを組込む。
3. 9692-2080-07　3本で締付ける。
4. 0114にFig. 32のようにグリース（No.006）を塗り，ボデーに取付け，9695-2040-07，9615-2030-07で締付ける。
   注意事項：組込んだ際，0114のレバーを押すとプリント基板側に連動することを確認する。
5. 0114のスプリングの掛け方はFig. 55参照。
6. 距離計調整は調整編（P 4 - 5）参照。

N. カウンターブロック組込み要領

1. カウンターブロックを巻取軸に通し，9692-2050-07　2本で取付ける。
2. カウンター調整は調整編（P 3 - 4）を参照。

Fig. 54

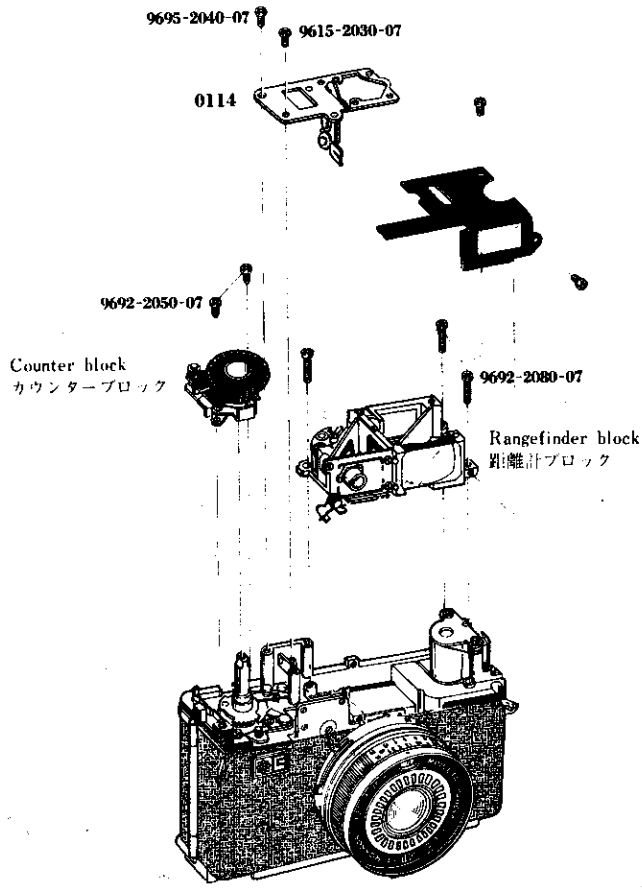
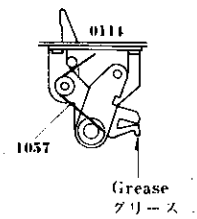

9695-2040-07
9615-2030-07
0114
9692-2050-07
Counter block
カウンターブロック
9692-2080-07
Rangefinder block
距離計ブロック

Fig. 55


0114
1057
Grease
グリース

O. Top Cover Assembly

1. Apply grease (No. 006) to 3101, as shown in Fig. 57, and fix it to the body by opening the back cover.
2. Put 2001, 2004, and 2003 through 0112, fix it to the body, and fasten it with two 9695-2040-04.
3. After checking that the cord soldered to 0104 is not depressed by 0104, fasten four 9615-1730-01.
4. Put 3002, 0310 and 3004 through the winding axis, and fasten 3003.
5. Fasten 9615-1720-04, insert tweezers into the groove of 3101, and set 0317 and 3105 by turning them.
6. Fix 1012 on 0104.

P. Bottom Cover Assembly

1. Place 4211 in as shown in Fig. 58, and insert 4210 into it.
2. Fix 1003 to the body by depressing 4211 and 4210, and fasten it with two 9695-2040-04.

O. 上カバー取付け要領

1. 3101にグリース (No.006) をFig. 57のように塗り，裏ブタを開き取付ける。
2. 0112に2001，2004，2003を通し，ボデーに取付け9695-2040-04　2本で締付ける。
3. 0104にハンダ付けされているコードが0104で押えられていないことを確認して9615-1730-01　4本を締付ける。
4. 3002，0310，3004を巻取軸に通し，3003を締付ける。
5. 9615-1720-04を締付け，3101の割れ溝にピンセットを入れ，0317，3105を回転させて取付ける。
6. 1012を取付ける。

P. 下カバー取付け要領

1. 4211をFig. 58のように入れ，4210をはめ込む。
2. 4211，4210を押えながら1003をボデーに取付けて，9695-2040-04　2本で締付ける。

Fig. 56

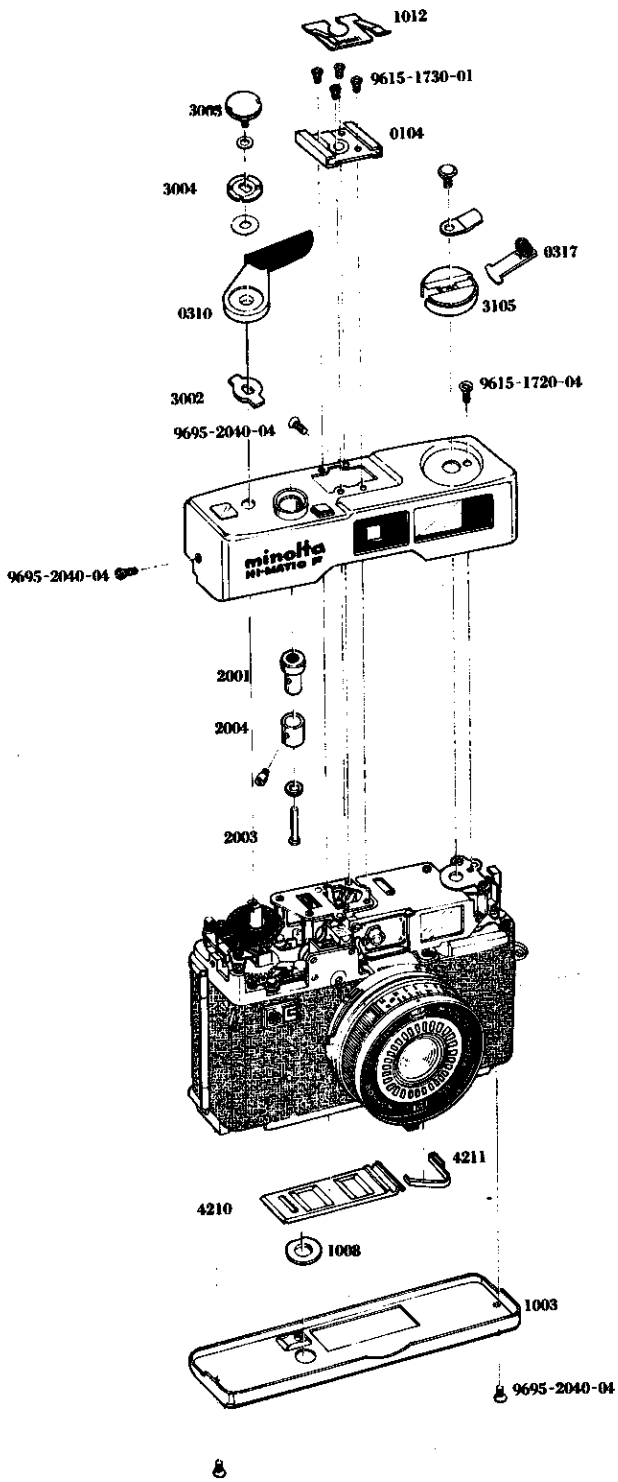
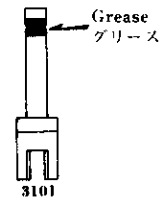


Fig. 57



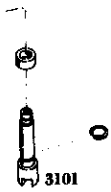
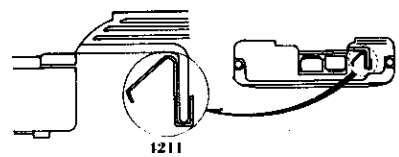


Fig. 58



168 CHECK LIST

168　点検一覧表

Winding check ····· 1

Rewinding check ····· 1

Counter check ····· 2

Back cover check ····· 2

Shutter check ····· 3

Lamps check ····· 6

Finders check ····· 7

Lenses check ····· 7

Others check ····· 8

Time lag and exposure time for synchro photography ····· 9

巻上げ関係 ····· 1

巻戻し関係 ····· 1

カウンター関係 ····· 2

裏蓋関係 ····· 2

シャッター関係 ····· 3

ランプ関係 ····· 6

ファインダー関係 ····· 7

レンズ関係 ····· 7

その他 ····· 8

シンクロ撮影時の遅延時間及び露出時間について ····· 9

Winding Check

Check Place	Check Item	Checks	Adjustment
Winding Lever	Operation	(1) It operates smoothly with little vertical looseness and returns to its original position.	See "Adjustment" P. 11.
		(2) It takes up 1 frame of film correctly regardless of winding method (quick, slow and minced take-ups) and winding stop is made ready to release shutter.	
		(3) After releasing shutter, it insures taking up next frame.	
	Winding weight (Lever end)	(1) When loading camera with film, it is less than 1,100g up to 30 frames and less than 1,300g for more than 30 frames.	
Sprocket	Operation	(1) It operates normally when winding with added resistance of about 2kg·cm both in right and reverse directions.	See "Adjustment" P. 11.(3).
		(2) After completion of taking up film, shutter is released by turning it lightly in right or reverse direction.	
Spool	Operation	(1) Film is taken up smoothly.	9792-6078-86 (quality of material: Myror, 0.2t) 9793-6078-84 (quality of material: Teflon, 0.3t) 9796-6078-20 (quality of material: Bs, 0.6t) The above are selected. Teflon is used for "heavy" weight, while Myror is for "light" weight.
	Weight in racing	(1) 150 to 350g.	
Film Signal	Condition	(1) No film is loaded → No red signal appears.	See "Adjustment" P. 22.
		(2) Film is loaded → Red signal appears to more than 1/4 of right side of window (▨) when counter scale shows 1.	

Rewinding Check

Check Place	Check Item	Checks	Adjustment
Rewind Button	Operation	(1) It operates smoothly without hitching or malfunctioning.	See "Adjustment" P. 33.(1).
		(2) When loading camera with film, rewind button returns to its original position by take-up operation for 1 frame and sprockets catch film correctly.	
		(3) Rewind button does not project from bottom cover. It correctly locks in place with sprocket racing and button does not fall under bottom cover.	
Rewind Crank	Operation	(1) It is free from eccentricity and roughness, and when lifted, back cover opens.	See "Adjustment" P. 33.(2).

Counter Check

Check Place	Check Item	Checks	Adjustment
Counter	Advance	(1) Scale becomes "1" by winding 2 or 3 times after closing back cover.	See "Adjustment" P. 34.
		(2) It advance 1 scale per take-up of frame and correctly operates up to counter scale 36.	
	Return	(1) When opening back cover, counter always returns to its starting position.	
	Operation	(1) It never deadlocks and skips, nor it is out of position due to vibration and shock.	

Back Cover Check

Check Place	Check Item	Checks	Adjustment
Back Cover	Opening or closing	(1) When closed, back cover locks in place with no looseness.	Bend part Ⓟ shown in Fig. 1 in direction of arrow.
		(2) When pulling up film-rewind knob, back cover spontaneously opens slightly.	Bend back cover slightly.
Film Pressure Plate	Condition	(1) It has a high degree of smoothness and is free from bend, projection, hollow and foreign matter.	Replace 0113 (Pressure plate set).
Film Pressure Roller	Operation	(1) It rotates lightly.	Bend part Ⓟ shown in Fig. 2 in direction of arrow.

Fig. 1

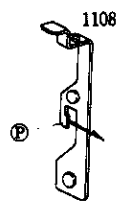
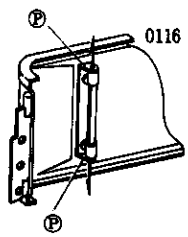


Fig. 2

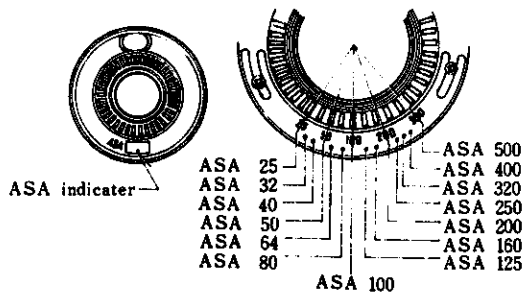


3

Shutter Check

Check Place	Check Item	Checks	Adjustment
Shutter Button	Operation	(1) It operates smoothly and returns to its original position without fail.	Se "Adjustment" P. 6 8.(1).
	Weight in releasing	(1) Less than 500g	
	Releasing position	(1) 0.5±0.5mm below button bearing surface.	9792-3140-20 (0.2t) or 9791-3140-20 (0.1t) is used properly.
	Clearance after release	(1) More than 0.5mm	
	Lighting of lamp	(1) When exposure prevention takes place, warning light does not function.	See "Adjustment" P. 6 8.(1)-③.
	Position of lamp lighting	(1) 1.8±0.5mm above button bearing surface.	
ASA Change-over Ring	Operation	(1) Each click (⅓ step) has click feeling and ring operates smoothly without any hitch.	Replace 4107 (ASA ring click spring).
	Scale aberration	(1) ASA 25, 50, 100, 200 and 500 → ASA indicater is in center of figure. ASA 32, 40, 64, 80, 125, 160, 250 and 320 → ASA indicater overlaps mark. See Fig. 3.	Loosen two screws, 9612-1420-07 shown in parts list on P.5, and fasten them after setting scale. (Be sure to do above while click takes effect.)
Shutter Speed	Exposure	(1) Camera···ASA: 100 Distance: Infinity (∞) Battery Voltage: More than 2.5V EE tester···ASA dial: 100 K value dial: 1.3 Measure SW: MEASURE Table-1 EE tester luminescence / EV Meter tolerance EV (LV) 7 — 0±1EV 〃 9 — 〃 〃 12 — 〃 〃 15 (14) — 〃 Measure exposure several times at above illuminations, and be sure average value is within tolerance of EV meter.	See "Adjustment" P. 8 12.

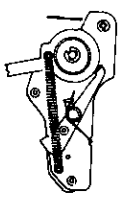
Fig. 3



Check Place	Check Item	Checks	Adjustment
Synchro	Continuity	(1) It ignites with correct strobo flash attached, but it never ignites during winding film.	See "Adjustment" P. 6 7.(2).
	Time lag (Time lag of shutter sectors)	(1) Synchro SW is turned on in range from 80% of sectors' full opening (F 3.5) to full opening (F 2.7). For particulars, see "Time lag and Exposure Time for Synchro Photography" on P. 9.	See "Adjustment" P. 10 13.
	Exposure time	(1) Time till sector closure (80% of full opening, F 3.5) after synchro SW is turned on is 20 to 40m. sec. For particulars, see "Time lag and Exposure Time for Synchro Photography" on P. 9.	
	Insulation resistance	(1) It is more than 10MΩ when measured using D.C. 250V insulation resistance meter.	Prevent short-circuit of lead wires.
	Contact efficiency	(1) More than 65% (When measured at range 2.5m. sec. of contact efficiency meter.)	See "Adjustment" P. 6 7.(1)
Self-Timer (Camera with self-timer applies only.)	Operation	(1) It does not start due to irregular, unsteady operation, double switching or shock.	Replace 2391 (Self-gear set) if mounted.
		(2) It starts when returning lever to its preset position after completion of charging it.	Replace 0708 (Release plate set) because of much looseness at incorrect shape.
	Operation time	(1) 7 to 13 seconds.	Replace 2391 (Self-gear set).
		(2) After turning off timer, time to maintain release plate is more than 1 second.	Fasten release plate by moving it in direction of arrow as in Fig. 4.

Caution: 1. On depression of shutter button with self-timer set, shutter is released without using self-timer.
2. If starting self-timer when set without charging, it stops halfway.

Fig. 4



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Check Place	Check Item	Checks	Adjustment
FM Mechanism	Aperture	(1) Aperture variation made by helicoid operation based on each guide number is within tolerance shown in Tables-2 and 3. Measuring instrument···EE tester Special tools···Bottom cover for the shutt shutter opening (168-1003-79) Accessory shoe plate (195-0601-79)	See "Adjustment" P. 10 15.

Table-2 **FM Aperture Tolerance**

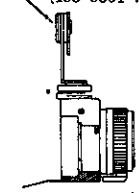
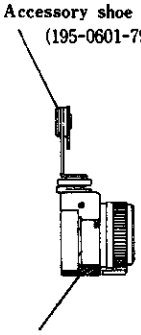
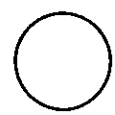
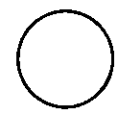
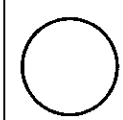
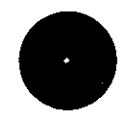
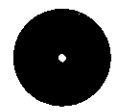
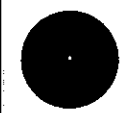
Camera			EE tester (Model 4P5MN3 made by Jonan Electric CO., LTD.)			
Special tool set	Range ring	GN ring	Tester set	F Value Dial	EV Meter tolerance	Effective F value
Accessory shoe plate (195-0601-79)  Bottom cover for the shutter opening (168-1003-79)	1.2m	20	• ASA Dial: F • K Value Dial: 1.3 • MEASURE SW: F MEASURE • Illumination Indicator Lamp : LV 9	F 16	−1.0EV～+1.0EV	F 16.6
	2.5m	〃		F 8	〃	F 8
	3.5m	〃		F 5.6	〃	F 5.71
	5 m	〃		F 4	〃	F 4
	2.5m	7		F 2.8	−1.0EV～+1.0EV	F 2.83
	〃	10		F 4	〃	F 4
	〃	14		F 5.6	〃	F 5.66
	〃	28		F 11	〃	F 11.31
	〃	40		F 16	〃	F 16
	〃	56		F 22	〃	F 22.63

Table-3 **FM Aperture Tolerance (Visual Inspection)**

Camera			Standard F No.	Visual Inspection		
Special tool set	GN ring	Range ring		Standard aperture	Largest aperture	Smallest aperture
Accessory shoe plate (195-0601-79)  Bottom cover for the shutter opening (168-1003-79)	14	∞	Full Aperture			
		0.8	17.5			
	56	∞	5.6			
		2.5	22.4			

Lamps Check

Check Place	Check Item	Checks	Adjustment
B. C. Lamp	Condition	(1) On depression of B. C. button, top cover's lamp and lamp in finder light.	See "Adjustment" P. 6 8. (2) B.
	Light voltage	(1) More than 1.9~2.1V. Connected to 1.9~2.1V of constant voltage D. C. power supply and on depression of B. C. button, lamp lights. See Fig. 5.	Replace 0703 (Printed base plate set).
Lamp within Finder	Condition	(1) Lamp is as shown in Table-4 on depression of shutter button.	When no difference is made for each item, ① prevention of lead wires from being disconnected. ② prevention of short-circuit. ③ for ⚡ mark, see "Adjustment" P. 5 6. (3).
Warning Lamp	Condition	(1) Same as lamp in finder. See Table-4.	Replace 0703 (Printed base plate set).
	Standard values	Table-5 (see below) With setting shown in Fig. 6, standard values must meet requirements in Table-5.	

Table-5

Luminescence box L-222	Camara ASA change-over ring	Lamp in camera finder	Standard value
EV 9 (ASA 100)	less than ASA 25	lit	7.9±1 EV (ASA 100)
	more than ASA 100	Gone	

Table-4 **Lamp within Finder**

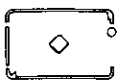
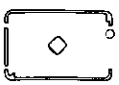
Camera setting	External light condition	Camera operation	Camera lamps: Lamp in finder	Camera lamps: Top cover lamp
Without flash gun set	More than EV 7.9	EE	 Lamp out	Lamp out
	Less than EV 7.9	EE	 Red lamp on → out Lamp on when shutter blades are fully opened. It lamp out when shutter blades are closed.	Lamp on ↓ Lamp out ↓ Lamp on ↓ Lamp out
With flash gun set	No brightness is related.	FM	Lamp on → out ⚡ mark appears in finder.	Lamp on ↓ Lamp out

Fig. 5

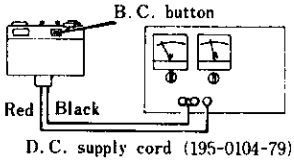
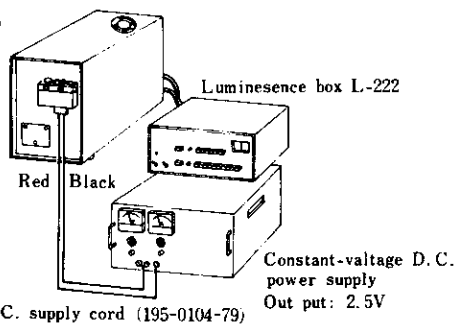


Fig. 6



Finders Check

Check Place	Check Item	Checks	Adjustment
Finder	Appearance	(1) Finder does not blur, nor does it have abnormal reflection.	See "Adjustment" P. 4 5. (1).
		(2) Warning signal has no color shading and does not blur.	See "Adjustment" P. 4 5. (2).
Rangefinder	Infinity in focus	(1) Apparent field of view is within 1.5' vertically and horizontally. Camera···Range ring: ∞ (infinity) As shown in Fig. 7, chart on collimator to be in focus.	See "Adjustment" P. 4 5. (4).
	Operation	(1) It operates smoothly with no time lag or crawl motion.	See "Adjustment" P. 4 5. (3).
Light Image Frame	Position	(1) Finder's field of view is always within actual picture plane.	Replace 0602 (Finder frame set).

Lenses Check

Check Place	Check Item	Checks	Adjustment
Helicoid	Operation	(1) It operates smoothly and is free from irregular performance, creak and roughness with no difference in weight between turning out and in.	Renew helicoid grease (No. 4).
			Replace 3549-0201 (Front lens group set).
	Scale aberration	(1) Index is within 1/2 of figure ∞. See Fig. 8.	Replace 0212 (Distance ring set) or 2123 (Filter ring, white) or 2523 (Filter ring, black).
		(2) Index must be correctly set to shortest range scale, 0.8m.	
Lens	Resolving power	(1) When measuring at F 2.7 (opening) at distance of 2m, Center·····more than 40 lines/mm Circumference ···more than 14.5 lines/mm	See "Adjustment" P. 11 16.
	Focusing	(1) Image must appear acceptably sharp by using collimator, focusing glass and magnifier. See Fig. 7.	

Fig. 7

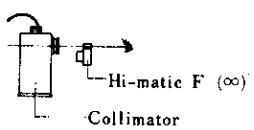


Fig. 8

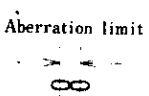
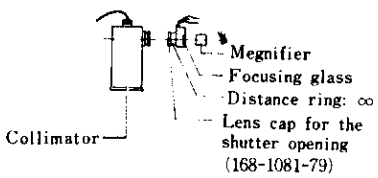


Fig. 9



Others Check

Check Place	Check Item	Checks	Adjustment
Lens Barrel	Condition	(1) It has no apperent jolt.	Refasten four lens berrel screws (9695-2055-07)
GN Ring	Operation	(1) It has click feeling and turns smoothly.	Replace 2127 (GN ring click spring).
			Replace 2113 (GN ring, white) and 2513 (GN ring, black).
	Scale aberration	(1) Index click takes effect within GN figure width.	Slide 2119 (GN plate without self-timer) and 2189 (GN plate with self-timer).
Signal Lever	Operation	(1) Signal lever is pushed down when inserting flash gun in accessory shoe and returned to its original position when removing flash gun. (Regardless of speed of insertion or removal.)	See "Adjustment" P. 56.
Checker Button	Operation	(1) It returns to its original position when lifting finger from depressed button.	See "Adjustment" P. 68. (2).
		(2) No light appears at slightest touch.	
Battery	Operation	(1) Battery cover must be easily opened or closed with finger.	Replace 4210 (Battery compartment cover) or 4211 (Battery compartment cover lock spring).
	Condition	(1) Battery name plate is not noticeably slanted and floated.	Replace 4213 (Battery name plate).
		(2) No segment is corrosive.	Clean or replace 4201 (Battery contact plate-A) and 4202 (Battery contact plate-B).
Film rubbing plane	Condition	(1) Film rubbing plane and pressure plate contact guide rail plane are scratched.	Repair impossible.
	Film tunnel stage difference	(1) 0.2 ± 0.02mm	
Synchro terminal	Electric shock	(1) No short-circuit occurs when placing metallic flat plate on terminal contact segments.	Replace 2291 (Synchro terminal set) or see "Adjustment" P. 67.
	Insulation resistance	(1) More than 10MΩ.	
	Operation	(1) No short-circuit occurs during depressing shutter button or when operated automatically at illumination of more than EV 7.9.	

9

Time Lag and Exposure Time for Synchro Photography

1. Tools to be Used

Measuring Instruments·····Strobo retarder, EE tester and Constant-voltage D.C power supply.

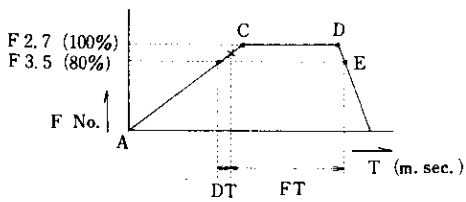
Special Tools ·····Accessory shoe plate (195-0601-79) and D.C. supply cord (195-0104-79).

2. Measurement

(1) The triangle waveform shutter (apodized shutter) differs in time lag from sectors of conventional shutters, making it impossible for exsting shutter testers to measure a period of seconds. (See "Explanation of Mechanism" in 168 Service Manual.) Therefore, time lag and exposure time are measured by using the strobo retarder and EE tester in combination.

(2) Explanation of measured items.

Fig. 10



AC ·····Sector opening time.
X ·····Place of synchro switch "ON"
BX (DT) ···Switch-on-time during period from more than F 3.5 (80% of sector full opening) to F 2.7 (Sector full opening)·····Time lag.
XE (FT) ···Time during period till sector closure (80% of sector full opening) after switch-on·····Exposure time.

3. Measuring Conditions

(1) The time lag of sectors is correct when meeting the following three requirements:

① Auto exposure.

② Synchro switch-on-time·····DT.

③ Time from sector opening (80% of full opening) to sector closure (80% of full opening)·····FT.

(2) Measurements are made in the following order, each item meeting with the requirement.

Auto Exposure → DT → FT

4. How to Measure.

(1) Measuring auto exposure

Exposure is correct if meeting the standard values in Table-5 when measured by using the EE tester. However, measurement of EV 3 is omitted as you can rely on the precision of the shutter.

Table-5

Camera	EE Tester		
		Illumination	EV meter tolerance
Storobo set ···Not provided	ASA Dial: 100	EV (LV) 7	0 ± 1 EV
ASA·····100	K Value Dial: 1.3	〃 9	0 ± 1 EV
Distance ring···∞ (Infinity)	MEASURE SW: MEASURE	〃 12	0 ± 1 EV
		〃 15(14)	0 ± 1 EV

(2) Measuring DT (Time lag)

Permissible Range·····More than 0 m. sec.

Adjustment ·····See "Adjustment" P. 10-13.

① Set the strobo retarder's range change-over switch to "0". See Fig. 12.

② If the sector aperture is more than F 3.5 (80% of full opening) when observing illumination while holding the camera against the diffusion disk (illuminant plane), the measured time lag is correct.

Note: Aperture at F 3.5 (80% of full opening) See Fig. 11.

(3) Measuring FT (Exposure time)

Permissible Range·····20 to 40m. sec.

Adjustment ·····See "Adjustment" P. 10-13.

① Set the strobo retarder's range change-over switch to "50m. sec." See Fig. 12.

② Set the retarding dial to "20m. sec." See Fig. 12.

③ If the sector aperture is more than F 3.5 (80% of full opening) when observing illumination while holding the camera against the diffusion disk (illuminant plane) the measured exposure time is correct.

④ Now set the strobo retarder's retarding dial to more than 40m. sec. See Fig. 12.

⑤ If the sector aperture is less than F 3.5 (80% of full opening) when observing illumination while holding the camera against the diffusion disk (illuminant plane), the measured exposure time is correct.

Fig. 11

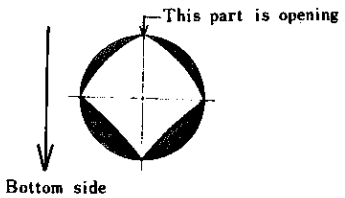
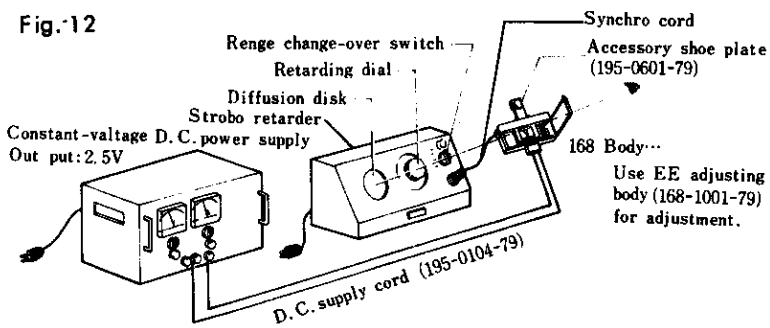


Fig. 12



巻上げ関係

点検箇所	点検項目	点検要領	調整
巻上げレバー	作動	(1) 円滑で上下ガタが少なく元の位置まで戻ること。	調整編 P. 1-1. 参照
		(2) 巻取方法（早く，遅く，小刻み等）に関係なく確実にフィルムを1コマ分巻取り，レリーズできる状態で巻止めが効いていること。	
		(3) シャッターレリーズ後，確実に次の巻取りができること。	
	巻上げ重さ（レバー先端）	(1) フィルム装填時，30枚まで1100g 以下，30枚以上1300g 以下。	
スプロケット	作動	(1) 正・逆方向共2kg・cm 程度の抵抗を加えて巻上げても正常であること。	調整編 P. 1-1.(3) 参照
		(2) 巻取り完了後，正・逆方向に軽く回転させてもシャッターが切れること。	
スプール	作動	(1) 円滑にフィルムが巻取れること。	9792-6078-86（材質：マイラー，0.2t），9793-6078-84（材質：テフロン，0.3t），9796-6078-20（材質：Bs，0.6t）を選択する。 重い時……テフロン使用 軽い時……マイラー使用
	空転重さ	(1) 150～350g	
フィルムシグナル	状態	(1) フィルム未装填時→赤シグナルが見えないこと。	調整編 P. 2-2. 参照
		(2) フィルム装填時→カウンター目盛が1の時，赤マークが右¼（▨）以上出ること。	

巻戻し関係

点検箇所	点検項目	点検要領	調整
巻戻し釦	作動	(1) 円滑で引掛りやムラがないこと。	調整編 P. 3-3.(1) 参照
		(2) フィルムを装填し，1コマ分の巻取操作により巻戻し釦が元の位置に戻り，スプロケットが確実にかかること。	
		(3) 巻戻し釦は下カバーより突出ていないこと。 押し止りが確実でスプロケットが空転し，釦が下カバーにもぐり込まないこと。	
巻戻しクランク	作動	(1) 偏心，キシミ，ザラツキ等がなく，持上げて裏ブタが開くこと。	調整編 P. 3-3.(2) 参照

2. Film Signal Adjustment

Trouble	Cause	Adjustment
(1) Film signal does not return to its original position Red signal remains to appear after completion of film rewind.	① 3241 (Express film lever) falls in Body's groove and does not return to its original position. See Fig. 6.	Bend 3241 (Express film lever) in direction of arrow shown in Fig. 6. Arrow indicate so that it does not fall in Body's groove. Adjust 3241 by bending it up or down so that it operates between Body and 0325 (Counter plate set). See Fig. 7.
	② 3241 (Express film lever) is in contacts 0325 (Counter plate set).	
(2) Film signal falls short of place. When loading camera with film with counter scale showing 1, red mark (3241) does not reach more than 1/4 or right side of SLS window (1029).	① Start position of 3241 (Express film lever) is turned toward broken line B shown in Fig. 8.	As shown in Fig. 8, bend 3241 (Express lever film) from B toward A. **Caution:** If it is bent too much toward A, film signal for 36th frame goes beyond SLS window. **Check:** When counter scale shows 1 with film loaded, red mark is at more than 1/4 of right side of SLS window (1029).
(3) Film signal fails to operate.	① 3242 (Express filler axis) and body rub too tightly.	Slightly enlarge Body's hole for 3242 (Express filler axis).
	② 3243 (Express filler axis spring) off.	Reset 3243. See Fig. 9.
	③ The return of 3241 (Express film lever) is incorrect.	Reset 3243 (Express filler axis spring). See Fig. 9.
(4) The operation of the winding lever becoms incorrect after about five times of winding, as a result of which film winds around sprocket.	① 3250 (Express filler) contacts 1030 (Body light shield plate B) or 0308 (Spool set).	Bend 3250 (Express filler) up or down so that it does not contact 1030 (Body light shield plate B) or 0308 (Spool set). See Fig. 10.

Fig. 6

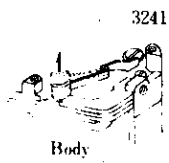


Fig. 7

Fig. 8

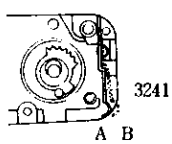
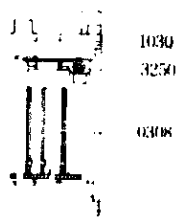


Fig. 9

Fig. 10



3. Adjustment in case Film Rewinding is Impossible.

Trouble	Cause	Adjustment
(1) Rewind button fails to operate smoothly.	① Rewinding button rubs hole on bottom cover. See Fig. 11.	Slightly slide mounting position of bottom cover.
	② 3045 (Sprocket axis receiver: upper) is mounted on a slant.	Fix 3045 (Sprocket axis receiver: upper) into Body's hole by pushing it down as shown in Fig. 12.
	③ The fit between 3043 (Sproket gear) and tight 3044 (Sproket axis) is hard.	Lap the fit-hole of 3043 (Sproket gear).
	④ The height of the Body A is not indentical to that of 3058 B in Fig. 13.	Put a washer of 0.2mm thickness between 3058 (Signal lever plate set axis) and 0111 (Accessory clip plate set) or don't so firmly tighten the screw (0615-2030-07) which fasten 0111 and 3058. **Note:** Confirm the change-over of FM.
	⑤ The tighting position of 3051 (Sproket axis nut) is incorrect.	Adjust the tighting of 3051 so that the rewinding button can be smoothly operated.
(2) Rewind crank fails to operate smoothly.	① Back cover incorrectly fitted into Body.	Bend back cover slightly.
		Replace 0116 (Back cover set)
	② 0311 (Rewinding plate set) is not fitted in to hole of body.	Move 0311 (Rewinding plate set) a little.

Fig. 11

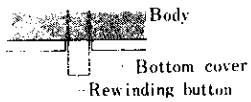


Fig. 12

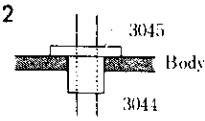
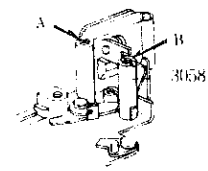


Fig. 13



4. Counter Adjustment

Trouble	Cause	Adjustment
(1) Counter does not indicate presence of film when advanced.	① When back cover is closed as shown in Fig. 14, part b of 0325 (Counter plate set) is pressed by part c of 0323 (Zero return lever set) and part a of 0325 is off pawl of 0324 (Counter dial set).	Draw up counter plate set (0325) to back cover and screw. Bend part c of 0323 (Zero return lever set) in direction of arrow. See Fig. 14. **Caution:** If part c of 0323 is bent too much, part a of 0325 (Counter plate set) does not come off pawl of 0324 (Counter dial set) when back cover is opened. See Fig. 14.
	② 3223 (Zero return spring) off.	Reset 3223.
	③ 3212 (Counter ratchet lever spring) off.	Reset 3212. See Fig. 15.
	④ Individual levers of 0325 (Counter plate set) fail to operate.	Replace 0325.
	⑤ Lead wires hitch.	Rearrange lead wires.

Fig. 14

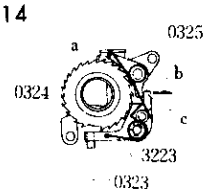
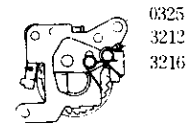


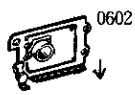
Fig. 15



5 . Viewfinder and Rangefinder Adjustment

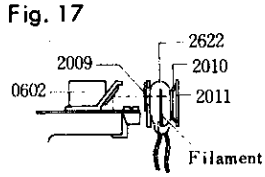
Trouble	Cause	Adjustment
(1) Viewfinder fram blurs.	① Shape of 0602 (Finder frame set) incorrect.	Bend oblique lined part shown in Fig. 16 in direction of arrow.
(2) Warning signal blurs and color-shades.	① 2009 (Lamp filter) has scratches and color shading.	Replace 2009.
	② 2009 (Lamp filter) mounted incorrectly.	Stick 2009 on 2011 (Lamp holder). See Fig. 17.
	③ Position of 2622 (Signal lamp) is incorrect.	As shown in Fig. 17, change filament of 2622 (Signal lamp) and its mounting position.
(3) Rangefinder malfunctions.	① Main lever set (0601) fails to operate.	Interlock 2128 (Range finder operation pin) with 0601 (Main lever set) as indicated in Fig. 18 Ⓟ.
	② 5012 (Main lever spring) off.	Reset 5012 as shown in Fig. 18.
	③ 2128 (Range finder operation pin) fails to operate.	As shown in Fig. 19, pass reamer through hole of 0215 (Guide ring set).
		Loosen four screws (9695-2055-07) shown in Fig. 20 and slide base plate slightly.
(4) Infinity is out of focus.	① Adjustment is incorrect.	① Right and left adjustment. Under condition shown in Fig. 21, bring chart into focus by turning right and left adjusting screws indicated in Fig. 22. ② Vertical adjustment. Under condition shown in Fig. 21, bring chart into focus by turning vertical adjusting screw indicated in Fig. 22. ③ Short-distance adjustment. Set distance ring to 2m (Helicoid delivery length is 0.2±0.015mm), place chart at distance of 2m from film rubbing plane and bring it into focus by turning short distance adjusting screw shown in Fig. 22.

Fig. 16



Bend oblique lined part show in direction of arrow.

Fig. 17



Mount 2622 (lamp) so that its filament is positioned on dotted line.

Fig. 18

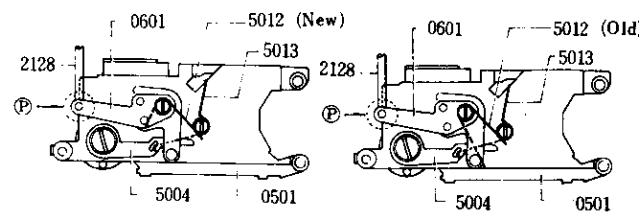


Fig. 19

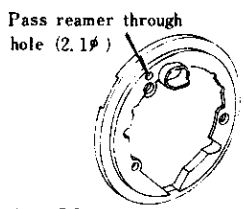
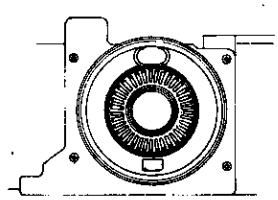


Fig. 20



└ 9695-2055-07

Fig. 21

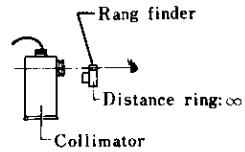
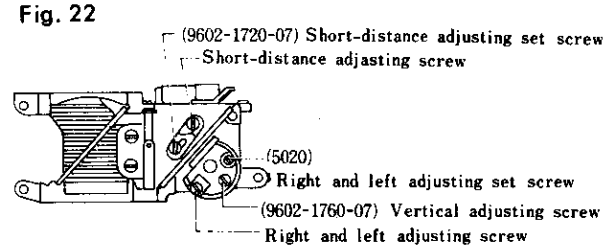


Fig. 22


(9602-1720-07) Short-distance adjusting set screw
Short-distance adjasting screw
(5020)
Right and left adjusting set screw
(9602-1760-07) Vertical adjusting screw
Right and left adjusting screw

6. Signal Lever Adjustment

Trouble	Cause	Adjustment
(1) Light does not appear when releasing shutter at blace (More than EV 8) with flash gun inserted in accessory shoe.	① Part 1 of cam lever is small, causing shutter not to change over to FM circuit.	Enlarge part 1 of cam lever. See Fig. 23. **Caution:** If part 1 is enlarged too widely, signal lever does not return to its original position.
(2) 0108 (Signal lever set) does not return to its original position after removing flash gun.	① Part 1 of cam lever is too large.	Make part 1 of cam lever smaller. See Fig. 24. **Caution:** If part 1 is too small, shutter is not changed to FM. Confim that the accessary shoe contacts 0108 (Signal lever set).
	② 1057 (Signal lever spring) off.	Reset 1057. See Fig. 25.
(3) ϟ mark always appears in finder when flash gun is not inserted.	① ϟ mark cover plate is off ϟ mark of 0602 (Finder frame set). See Fig. 26.	With no flash gun inserted, 0108 is not pushed down, bend part Ⓟ in direction of arrow until ϟ mark cover plate hides ϟ mark of 0602. See Fig. 27.
	② 5025 (Flush mark cover plate spring) off.	Reset 5025. See Fig. 26 or 27.

Post-Adjusting Check:

- If light (red) is on when releasing shutter with light receiving part facing bright place (more than EV 8) under condition where 0108 (Signal lever set) is pushed down-same condition as when flash gun is mounted, the change-over to FM circuit is already made.
- Be sure at this time that ϟ mark appears within finder.

Fig. 23

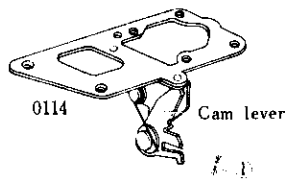
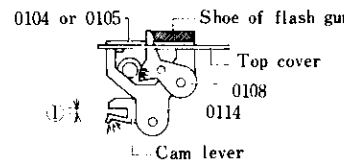


Fig. 24



Put a little bit of grease to arrows indicate.

Fig. 25

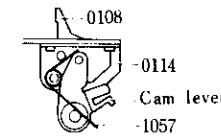


Fig. 26

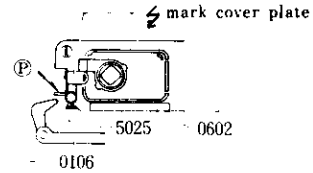
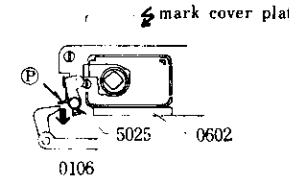


Fig. 27



7. Synchro and Synchro-Terminal Adjustment

Trouble	Cause	Adjustment
(1) Contact efficiency is low. Efficiency is less than 65% when measured at range 2.5m. sec. of contact efficiency meter.	① Contact pressure of 2212 (Synchro contact) or 2213 (Earth contact) is small.	As shown in Fig. 28, bend contact segment in direction of arrow.
	② Contact segment dirty.	Clean contact segment.
(2) Synchro continuity faulty. Strobo ignites during winding.	① 2291 (Synchro terminal set) and 2212 (Synchro contact) or 2213 (Earth contact) are out of contact.	Clean contact parts and bend contact segments in directions of arrows as shown in Fig. 28.
	② 2012 (Top cover lead wire) disconnected.	Replace 2012 (Top cover lead wire).
	③ 2291 (Synchro terminal set) short-circuits.	Replace 2291 (Synchro terminal set).
	④ 2213 (Earth contact) short-circuits. See Fig. 29.	Adjust 2213 (Earth contact) so that it contacts only outside (earth side) of 2291 (Synchro terminal set).

Fig. 28

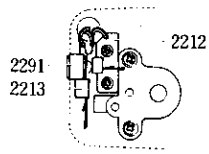
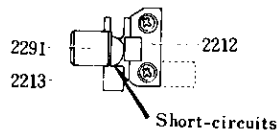


Fig. 29



8. Button Operation Adjustment

Trouble	Cause	Adjustment
(1) Shutter button fails to operate. Shutter button does not operate smoothly, nor does it return to its original position.	① 2004 (Shutter release button ring) not smoothed.	Replace 2004.
	② lead wires loosened and caught.	Rearrange lead wires.
	③ 0708 (Release plate set) malfunctions.	Extend oblique lined part of 0708 (Release plate set) as shown in Fig. 30. If it is extended too much, 2610 (Winding release plate) will malfunction. After adjusting, check that 0708 operates smoothly.
(2) Checker button fails to operate. A. Button does not return to its original position after being pressed.	① 4045 (B. C. button) not fitted in Body correctly.	Replace 4045.
	② 4047 (B. C. spring) off.	Reset 4047. See Fig. 31.
	③ Lead wires entangled.	Rearrange lead wires.
B. Light appears at the slightest touch.	① Lead wires to switches	Resolder lead wires.
	② 4043 (B. C. contact-A) and 4044 (B. C. contact-B) are almost contact pattern of 0404 (B. C. contact plate set).	Bend the contact point of 4043 (B. C. contact-A) and 4044 (B. C. contact-B).

Fig. 30

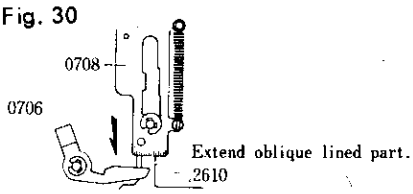
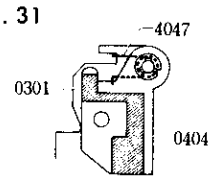


Fig. 31



9. Switch Contact Adjustment

Clean stains from switch contact segments, contact segment bearers and printed base plate patterns with alcohol. Do not wipe them with roughly napped or hard cloth.

(1) Adjustment of SW_1 (Power SW) and SW_2 (Warning SW) Adjustment

Contact segments to be about 2.8mm in height.

(2) SW_3 (Timing SW) adjustment

① Adjust the space between contact segment and its bearer to be about 0.5mm when they are released. See Fig. 33.

② Adjust contact segment and its bearer so that the former pushes the latter in about 0.2mm when they are set.

(3) SW_4 (Auto-FM change-over SW) adjustment

Adjust SW_4 by bending 2603 (Changing switch A) so that plane Ⓐ of 2601 (Changing switch axis-A) and the contact section of 2603 are almost level as shown in Fig. 35.

(4) SW_5 (Auto-FM changeover SW) Adjustment

Adjust SW_5 by bending 2604 (Changing switch B) so that plane Ⓑ of 2602 (Changing switch axis-B) and the contact section of 2604 are almost level as shown in Fig. 36.

(5) SW_6 (Synchro SW) adjustment

Adjust the space between contact segment and its bearer to become 0.5mm and that between the contact segment and the pin of 0709 (Main lever set) to be 0.5mm when the shutter blades are closed.

(6) Adjustment of SW_7 (B.C. SW) and SW_8 (B.C. Power SW)

Adjust 4043 (B.C. contact A) and 4044 (B.C. contact B) by turning them so that they do not come off the printed base plate of 0404 (B.C. contact plate set) when moving 0404 slightly in the direction of arrows.

Fig. 32

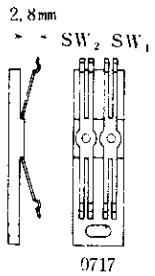


Fig. 33

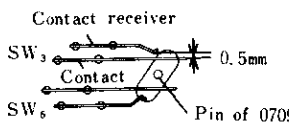


Fig. 34

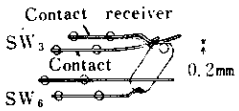


Fig. 35

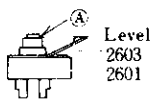


Fig. 36

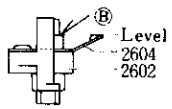


Fig. 37

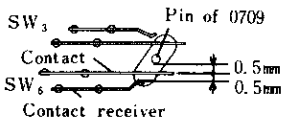
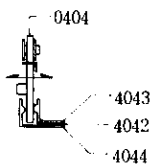


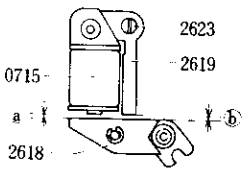
Fig. 38



10. Magnet Position Adjustment

Fasten 2623 (Magnet set-screw) so that clearances ⓐ and ⓑ are almost equal when moving 2618 (Suction lever) in the direction of arrows or when charging the magnet.
When adjusting, be certain that, if 0715 (Magnet coil set) is strongly depressed, 2619 (Magnet core) is moved causing 0715 and 2619 to be unequal in height although clearances ⓐ and ⓑ are equal.

Fig. 39

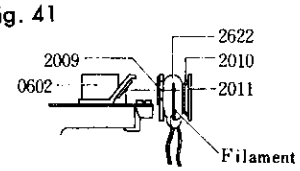


11. Lamp Position Adjustment

Slide 2622 (Signal lamp) so that the window shown by the arrow in Fig. 40 is illuminated brightly.
Be sure that the of 2622 (Signal lamp) is positioned as shown in Fig. 41, when seen from the top of the camera.

Fig. 40

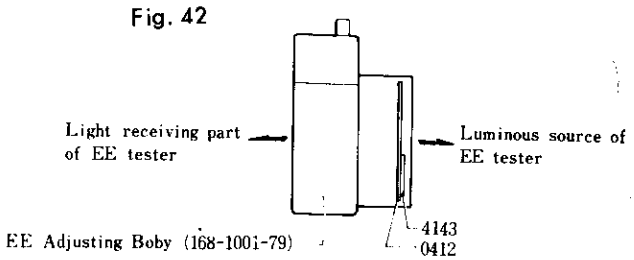
Fig. 41



12. EE Adjustment

Camera ·····Lens barrel part is assembled (Lens is also built in)
Measuring instrument·····EE Tester
Special tool·····EE Adjusting Body (168-1001-79)

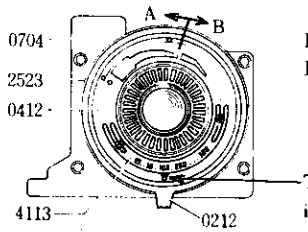
Fig. 42



(1) Adjustment at EV 7.

① Set the EE tester to EV 7.
② Mount the lens barrel part on the EE adjusting body and place it on the EE tester.
③ Turn 0412 (ASA slit plate set) so that the EE tester's EV meter becomes "0". If the EV meter does not become "0" by turning 0412, affix 4115 (ND filter-A) to the front of CdS.
④ Maintaining the condition of ③ above, screw 4113 (ASA plate) at the position of ASA 100.

Fig. 43



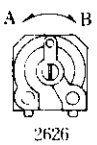
In case of "Over"·····Turn 0412 in the direction of arrow B.
In case of "Under" ···Turn 0412 in the direction of arrow A.

This hole is for the position of ASA index. Screw 4113 so that its ASA 100 is positioned at this hole.

(2) Adjustment at EV 15 (EV 14).

① Set the EE tester to EV 15 (EV 14).
② Turn 2626 (Valiable resistor) so that the EE tester's EV meter becomes "0".

Fig. 44



In case of "Over"·····Turn 2626 in the direction of arrow A.
In case of "Under" ···Turn 2626 in the direction of arrow B.

(3) Checking EV 12

① Set the EE tester to EV 12.

② When the EE tester's EV meter does not become "0", distribute the value indicated by the EV meter to EV 12 and EV 15 (EV 14) respectively.

(4) Check points

① Be sure that the values measured at ASA 100 for EV 7, EV 12 and EV 15 (EV 14) are within 0 ± 1 EV.

② Be sure that there is a click and smooth operation at each stage while turning the ASA ring from ASA 25 to ASA 500.

Mount of 0412 (ASA slit plate set) and 4113 (ASA Plate)

Fig. 45

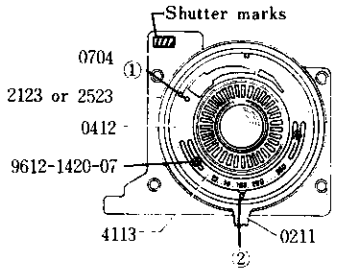


Table- I

Shutter marks (Stamp marks)	3	2	1	0	− 1	+1N	N	−1N
Position of 4113 (ASA plate)	50	64	80	100	125	80	100	125
4115 (ND filter-A) affixed to front of CdS	Not affixed					Affixed		

(1) Set the hole of 2123 or 2523 (Filter ring) to that of 0412 (ASA slit plate set) as shown in ① of Fig. 45, and loosen two screws (9612-1420-07).

(2) Set the scale of 4113 (ASA plate) to the hole of 2123 or 2523 shown in ② of Fig. 45. Based on the shutter marks in Table-1, set the corresponding ASA scale to the hole of ②.

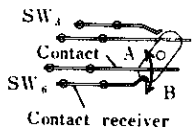
Examples of Setting ASA Scales

- When 0704 (Shutter base plate set) is marked by an "1", set mark of ASA 80 to the hole of ②.
- When 0704 (Shutter base plate set) is marked by an "N", set the center of figure ASA 100 to the hole of ② and affix 4115 (ND filter-A) to the front of CdS.

Caution:
- The foregoing is a method where 0412 and 4113 are mounted without replacing 0703 (Printed base plate set). When 0703 is replaced, follow the adjusting method of EV 7.
- After assembling, be sure that the previously mentioned check points are made satisfactory.

13. Synchro Time Adjustment

Fig. 46



Camera ·····Lens barrel part is assembled (Lens is also built in).
Measuring Instruments···Strobo Retarder, Constant-Voltage D.C. Power Supply (E1 or E2).
Special Tools ·····Accessory Shoe Plate (195-0601-79)
D.C. Supply Cord (195-0104-79)

(1) DT (Time lag) Adjustment·····More than 0 m. sec.

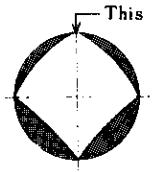
In case of "Minus"·····Turn the contact segment bearer of SW_6 shown in Fig. 46 in the direction of arrow A to adjust aperture to be more than F 3.5.

(2) FT (Exposure time) Adjustment·····20 to 40 m. sec.

In case of "Minus"·····Turn the contact segment bearer of SW_6 shown in Fig. 46 in the direction of arrow A to adjust aperture to be more than F 3.5.

In Case of "Plus"·····Turn the contact segment bearer of SW_6 shown in Fig. 46 in the direction of arrow B to adjust aperture to be more than F 3.5.

Fig. 47 Aperture at F 3.5 (80% of full opening)



(3) Checking

Be sure to check the following:
D T·····0 m. sec.
F T·····20 to 40 m. sec.

14. Contact Efficiency Adjustment

Turn the contact segment bearer of SW_6 shown in Fig. 46 in the direction of arrow A so that the contact efficiency becomes more than 65%. Be sure to check DT and FT.

15. FM Aperture Adjustment

Camera ·····Lens barrel part is assembled (Lens is also built in).
Measuring instruments·····EE Tester (Model 4P5MN3 made by Jonan Electric Co., Ltd).
Constant-voltage D.C. power supply.
Special tools ·····EE adjusting body (168-1001-79)
Accessory shoe plate (195-0601-79)
Bottom cover for the shutter opening (168-1003-79)
D.C. Supply cord (195-0104-79)

(1) Smallest aperture (F 22) adjustment.

In Case of "Under"·····Turn the kick frame part of 0710 (Kick lever set) in the direction of arrow A. See Fig. 48.

In Case of "Over"·····Turn the kick frame part of 0710 (Kick lever set) in the direction of arrow B. See Fig. 48.

For standard values, see Tables 2 and 3.

(2) "Under" or "Over" adjustment at each distance.

In Case of "Under"·····Turn part Ⓟ of 0702 (Front plate set) or the pin of 0714 (Cam lever set) in the direction of arrow A. See Fig. 49.

In Case of "Over"·····Turn part Ⓟ of 0702 (Front plate set) or the pin of 0714 (Cam lever set) in the direction of arrow B. See Fig. 49.

For standard values, see Tables 2 and 3.

Fig. 48

Fig. 49

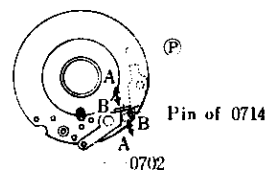


Table-2 **FM Aperture Tolerance**

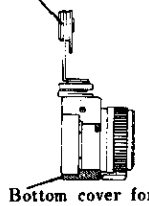
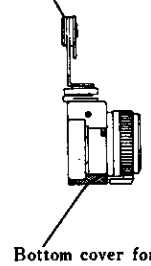
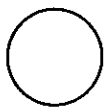
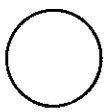
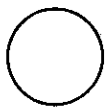
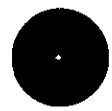
Camera			EE tester (Model 4P5MN3 made by Jonan Electric CO., LTD.)			
Special tool set	Range ring	GN ring	Tester set	F Value Dial	EV Meter tolerance	Effective F value
Accessory shoe plate (195-0601-79)  Bottom cover for the shutter opening (168-1003-79)	1.2m	20	• ASA Dial: F • K Value Dial: 1.3 • MEASURE SW: F MEASURE • Illumination Indicator Lamp: LV 9	F16	−1.0EV～+1.0EV	F16.6
	2.5m	〃		F 8	〃	F 8
	3.5m	〃		F 5.6	〃	F 5.71
	5 m	〃		F 4	〃	F 4
	2.5m	7		F 2.8	−1.0EV～+1.0EV	F 2.83
	〃	10		F 4	〃	F 4
	〃	14		F 5.6	〃	F 5.66
	〃	28		F11	〃	F11.31
	〃	40		F16	〃	F16
	〃	56		F22	〃	F22.63

Table-3 **FM Aperture Tolerance (Visual Inspection)**

Camera			Standard F No.	Visual Inspection		
Special tool set	GN ring	Range ring		Standard aperture	Largest aperture	Smallest aperture
Accessory shoe plate (195-0601-79)  Bottom cover for the shutter opening (168-1003-79)	14	∞	Full Aperture			
		0.8	17.5			
	56	∞	5.6			
		2.5	22.4			

16. Focus Adjustment

Camera·····Distance ring: ∞

Measuring instruments and tools·· Collimator, Constant-voltage D.C. power supply, Magnifier, focusing glass.

Special tools·····Lens cap for the shutter opeing (168-1081-79)
D.C. supply cord (195-0104-79).

- Loosen three 9107 (Helicoid set-screw), and tighten them at the position where the chart on the collimator appears acceptably sharp while operating the helicoid. See Fig. 50, 51.

Fig. 50

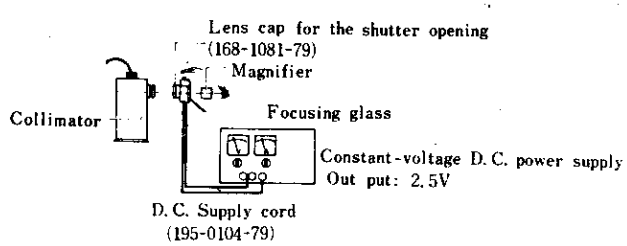
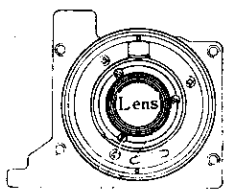



Fig. 51